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PART 8

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

HEARINGS

BEFORE THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

NINETY-EIGHTH CONGRESS

SECOND SESSION

ON

S. 2414

TO AUTHORIZE APPROPRIATIONS FOR FISCAL YEAR 1985 FOR THE ARMED FORCES FOR PROCUREMENT, FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, FOR OPERATION AND MAINTENANCE, AND FOR WORKING CAPITAL FUNDS, TO PRESCRIBE PERSONNEL STRENGTH FOR SUCH FISCAL YEAR FOR THE ARMED FORCES AND FOR CIVILIAN EMPLOYEES OF THE DEPARTMENT OF DEFENSE, AND FOR OTHER PURPOSES

PART 8

SEA POWER AND FORCE PROJECTION

MARCH 14, 28, 29, APRIL 5, 11, MAY 1, 1984

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DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

WEDNESDAY, MARCH 14, 1984

U.S. SENATE,
SUBCOMMITTEE ON SEA POWER AND FORCE PROJECTION,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

MARITIME STRATEGY

The subcommittee met in executive session, pursuant to notice, at 3:07 p.m., in room SR-232A, Russell Senate Office Building, Senator William S. Cohen (chairman) presiding.

Present: Senators Cohen, Quayle, Wilson, Nunn, Stennis, and Kennedy.

Staff present: Arnold L. Punaro, staff director for the minority; L. Wayne Arny III, William E. Hoehn, Jr., Bruce D. Porter, and Mark B. Robinson, professional staff members; Douglas R. Graham, research assistant; and Kathleen L. McGuire, staff assistant.

Also present: James H. Dykstra, assistant to Senator Cohen; Bernard R. Toon, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; Francis J. Sullivan, assistant to Senator Stennis; William S. Lind, assistant to Senator Hart; Matthew H. Murray and James Steinberg, assistants to Senator Kennedy.

OPENING STATEMENT OF SENATOR WILLIAM S. COHEN, CHAIRMAN

Senator COHEN. The subcommittee will come to order.

I would like to welcome Secretary of the Navy John Lehman; Admiral Watkins, the Chief of Naval Operations; and General Trainor, representing the Commandant of the Marine Corps. They will present testimony on U.S. naval strategy.

Because of the classified nature of much of the information being presented here today, we will remain in executive session for the afternoon.

This is the first Sea Power and Force Projection Subcommittee hearing in review of the fiscal year 1985 Department of Defense budget. During the last few years, this hearing has focused mostly on the maritime threat. We enlarged the scope of the hearing last year so that we could discuss both the threat and the balance of U.S. and allied forces.

This year we are taking an additional step in this hearing by asking the Secretary, the CNO, and the Commandant to discuss the current maritime strategy and its relation to the national strategy.

This extension of the subcommittee's past policy I think is useful in this year's budget authorization deliberations. This discussion should highlight our current plans and intentions as they derive from the current and expected capabilities of the threat, the current and expected capabilities of our own forces, and our national objectives and the goals of the administration.

We then should have a better understanding of the reasoning behind the procurement, R&D, and readiness programs that we have to review and must necessarily pass judgment upon.

I expect Senator Nunn to arrive later.

Senator Kennedy, if you have any opening remarks, we would be glad to receive them at this time.

Senator **Kennedy**. Thank you very much, Mr. Chairman. This is my first hearing as a new member of this subcommittee and I am looking forward to the work of the subcommittee. I appreciate very much the opportunity to participate with you and other members of the subcommittee, our witnesses who are here today and who will be here in the future.

I am delighted to have the chance to involve myself in these issues and hopefully to play a constructive and positive role.

Senator **Cohen**. Thank you.

Mr. Secretary, would you like to begin?

STATEMENT OF HON. JOHN LEHMAN, SECRETARY OF THE NAVY, ACCOMPANIED BY ADM. JAMES D. WATKINS, USN, CHIEF OF NAVAL OPERATIONS; AND LT. GEN. BERNARD E. TRAINOR, USMC DEPUTY CHIEF OF STAFF, PLANS, PROGRAMS, AND OPERATIONS (HQ/MC)

Mr. **Lehman**. Thank you, Mr. Chairman.

I would like to ask your indulgence for a somewhat unorthodox approach to the briefing.

I would like to propose that we give you a presentation that should be seen not as a straight briefing, but as a framework for discussion. In it, we are going to try to tie together strategy, resources, force structure, readiness, and as we go about preparing our budget through the year, how it coincides with operations and long-range planning.

Senator **Cohen**. I think that would be very helpful.

Let me tell you that the nature of the problem, as you will hear from many of us around the table, is that we are constantly being told that we have extended commitments and underfunded resources and capabilities.

In today's paper, for example, I think the GAO released a story indicating that we are $323 billion, or $343 billion, short on existing programs. Not to coin any phrases, but some people are going to ask, "Where's the beef?" [General laughter.]

The question "where are we going to find the military capability to back up the commitments?" will be asked.

As Senator Nunn might say, you can either change your commitment and start withdrawing forces and redrawing lines; you can beef up your capability—and nobody is proposing an increase over and above what the President is talking about, but probably a reduction instead; or you alter the strategy.

I think it would be helpful to view this matter in the larger context of exactly where we are committed, why do we have these commitments, and do we have the resources necessary to back them up, or should we make alternate plans, strategy and resources.

Mr. LEHMAN. That is our purpose today.

I think you will see that the way we use the term "strategy" is not quite the way some of the critics and the press use the term. There is no attempt in our use of strategy as an intellectual framework to guide the actions of a commander or for programming and planning to be a substitute for a commander's judgment on the scene in the inherent unpredictability of any future conflict.

Too often, the strategic analyst tends to try to usurp the function of the man, the commander on the scene. That is not the way we use the term "strategy."

If it would be acceptable, I would like to stand and informally present part of this brief, with the CNO and our deputy commandant.

If it is acceptable to you, I would like to have it so that anytime you want to expand on any of the points on any of the slides, we do it then that way or we can leave it to the end, if you wish.

Why don't we start with the first slide.

MARITIME STRATEGY OUTLINE

National military strategy;
Maritime objectives;
Force posture;
Global naval warfighting strategy;
Exercises;
POM building.

First, one way to look at this is as an outline of what we want to cover with you today. The way we run our Navy planning starts with national military strategy. From that strategy we derive our maritime objectives. From those objectives, we establish a force posture, a 600-ship Navy or whatever other force posture is recommended. Then, we derive through a process that we will explain to you, the actual warfighting strategy and the role of exercises which are so crucial to the development and validation of strategy, theater by theater. Then, from all of this, we will show how we build our budget in the request that ultimately comes to you.

There is a perception that somehow it sort of grows, but it really derives from this process.

NATIONAL MILIARY STRATEGY

Deterrence;
Forward defense,
Global coalition warfare.

The national military strategy is primarily based on deterrence, on deterring nasty things from happening to our national interest. It is based on forward defense.

We are deployed throughout NATO. Our fleet and air forces and ground forces are roughly where our vital interests are. We are forward deployed, and that development is fundamentally based on coalition approaches to all of our threats, not go-it-alone approaches, as an organizing framework.

NSADD-32 (20 MAY 82)

"US NATIONAL SECURITY STRATEGY"

Signed by the President;
Soviets the threat;
War likely to be global—sequential operations necessary;
Increasing importance of conventional forces—balanced forces;
Increasing importance of allies;
Forward peacetime posture.

This is the current guiding national security strategy. Obviously we all have heard the criticism that there is no strategy. But, while in a valid intellectual critique, there may be room to disagree with the current strategy, but it is simply not valid to say that there is no strategy.

This [indicating] is it. This embodies the framework of our national strategy today, national security design document, NSDD-32, and these are the elements.

As you will see, the problem we have to deal with is a global problem. We have to deal with its elements sequentially. We cannot deal simultaneously with every theater.

The conventional forces are the critical mass below the strategic umbrella. These forces must be balanced, land-based and sea-based, and the allies are sine qua non. We simply cannot approach any strategy without assuming very substantial allied participation, and a forward peacetime posture. Whatever starts is going to start from our forces being forward deployed.

[Slide deleted.]

Mr. LEHMAN. This is just a quick, rough schematic of a global war, which would be any war we become involved in with the Soviets, since they are engaged globally and their naval forces exist globally.

These SLOCs are a rough presentation of what we must keep open. These are our principal maritime objectives. We have to use them in order to survive, even for the first week, and to get deployed.

[Slide deleted.]

Mr. LEHMAN. This is a rough schematic of our alliances, treaties, and agreements.

Admiral WATKINS. If I may make a point, on the last slide, I think it is important to know that the whole issue around the Strait of Hormuz has two different aspects to it. The two aspects are that in peacetime, keeping the strait open is far more significant than in the early days of conflict.

So, what you are talking about under the President's initiative to keep the Strait of Hormuz open is the peacetime military mission which we are involved in today. The peacetime mission is much more important for the economic posture of the Western World than the wartime one.

In wartime, our analysis shows the strait could be closed for about 2 months without necessarily impacting severely the warfighting capability of either the United States or the allies.

I am bringing this up because SLOC protection has a different value in peacetime than in wartime, particularly oil SLOC.

So I think it is important to put this into context because sometimes we get our peacetime and wartime missions mixed up. We can survive in wartime with this strait closed for a period of time. I would say for 60 days, but this is theoretical. Certainly, it is not something for which we need to send large numbers of naval forces at the same time we are trying to take on the Soviet Union in the various fronts in northeast Asia and Europe.

Senator **Cohen**. If the Iranians should seek to close down the strait, is that peacetime or wartime?

Admiral **Watkins**. Well, that is a political decision. Unfortunately, we call things that used to be acts of war, "adventurism" today. So I am not sure how it would come out.

Senator **Cohen**. I am just wondering about your statement, about the significance of keeping it open in peacetime as opposed to allowing it shut in wartime. If the Iranians seek to close the strait, and we go in to keep it open, what are you talking about in political terms?

Admiral **Watkins**. I merely am pointing it out because I think it very clearly is involved in the whole discussion around the southwest Asia strategy.

The southwest Asia strategy was derived from a peacetime concept, far more than a wartime. Yet it is a very strong focal point for deterrence for the nation. There is no question about that.

We have to generate the capability to go in there in a regional conflict, which is not easy.

So, there are lots of good pieces of rationale that fit into a southwest Asia strategy in peacetime. I am merely bringing it up because it gets into the implementation of the contingency plans for the nation when you go to war, in a global sense with the Soviet Union. You don't go rushing over there with large forces and draw down all your logistic support and everything else to open that strait on day 1 of conflict because it really is not that necessary.

So I think those two points are very important as we deal with the variety of crises that we have in the world and the different strategies that take us from peacetime, say, to low levels of conflict, into crisis, into conflict with the Soviet Union.

Senator **Cohen**. Thank you very much, Admiral.

40 DIFFERENT TREATY PARTNERS

Mr. **Lehman**. You are familiar with and we often speak of the 40 different treaty partners that we have in a web of some seven security agreements. They form the political matrix of our military strategy.

The broad maritime warfighting objectives resulting from this national strategy are, first, to secure the critical sea lanes of communication; next, is to defeat the threat to interdict them, to neutralize the Soviet ability to interdict our SLOCs.

Senator **Kennedy**. Mr. Secretary, may I interrupt you to ask a question.

I wish to detain you here for just a moment.

What percent of the oil that comes through the straits goes to Western Europe and what percent comes to the United States, Admiral?

Admiral **Watkins**. That is variable. I believe the United States is 8 percent, depending on which figures you look at. It can go up to as high as 12 percent. It depends on how you work it out.

Thirty percent, nominally, is what is going to Europe, to some of the allies there, the West Germans and so forth. A larger percentage is going to Japan.

I could provide more accurate figures on that, but that nominally is the range.

Mr. **Lehman**. There has been a tremendous reversal in the last 3 years.

Senator **Kennedy**. That's right. I am aware of that. I was just interested in being current on those figures.

Also, I would be interested in what those particular countries are doing, if anything, in terms of supporting the President's statement in regard to keeping the lanes open.

What can you tell us about that?

Admiral **Watkins**. Clearly the French, the United Kingdom and the Persian Gulf States themselves provide support as does Australia to a degree. Japan has done little save their move toward providing a 1,000-mile SLOC protection, which improves our capability to project forces into the Indian Ocean. We would not be able to do that without some real support from the Japanese Maritime Self Defense Force. For the most part support for strait protection is rather nominal, except from France and the United Kingdom. France would give us significant help in that region were there to be any attempts by Khomeini to close the gulf.

Senator **Kennedy**. Thank you.

STRATEGIC POSITIONING

Mr. **Lehman**. Strategic positioning, of course, is a fundamental role. Ninety-five percent of the logistics has to go by sea, and the navy has the responsibility to provide that logistics support for the land battle. Much of the support, particularly in the early phases of a conflict, in most theaters, must come from a sea-based platform.

So, it is from that tasking, those maritime objectives, that the force structure is derived. It is looking at what is required in each theater, given the fact that we cannot be everywhere at once, even to meet our vital interests, and we have to move sequentially. That force structure is the 600-ship Navy. These are the principal components: 15 carriers, a complete MAF lift capability plus an independently deployable Marine amphibious brigade, 100 attack subs, 45 cruisers, 70 destroyers, 100 to 110 frigates, minesweepers, and the balance of support that goes with it.

BATTLE GROUP COMPOSITION

PEACETIME	WARTIME
1 CV/CVN	2-4
1-2 CG/CGN	4-8
2-3 DDG/DDGX	4-8
2-3 DD	4-8
1-3 SSN	3-4

JFK AIRWING	
24	F-14
24	A-6
5	KA-6
10	S-3
6	SH-3H
4	E-2C
4	EA-6B
77	

NEW AIRWING	
20	F-14
18	F/A-18
20	A-6
10	S-3
8	SH-60F
5	E-2C
5	EA-6B
86	

MIDWAY (F/A-18) AIRWING	
48	F/A-18
10	A-6
4	KA-6
10	S-3
6	SH-3H
4	E-2C
4	EA-6B
86	

Let me say one word about the term "battle group."

There is a lot of distortion in what a battle group is. A battle group can be almost anything that includes an aircraft carrier, as opposed to a surface action group, which does not.

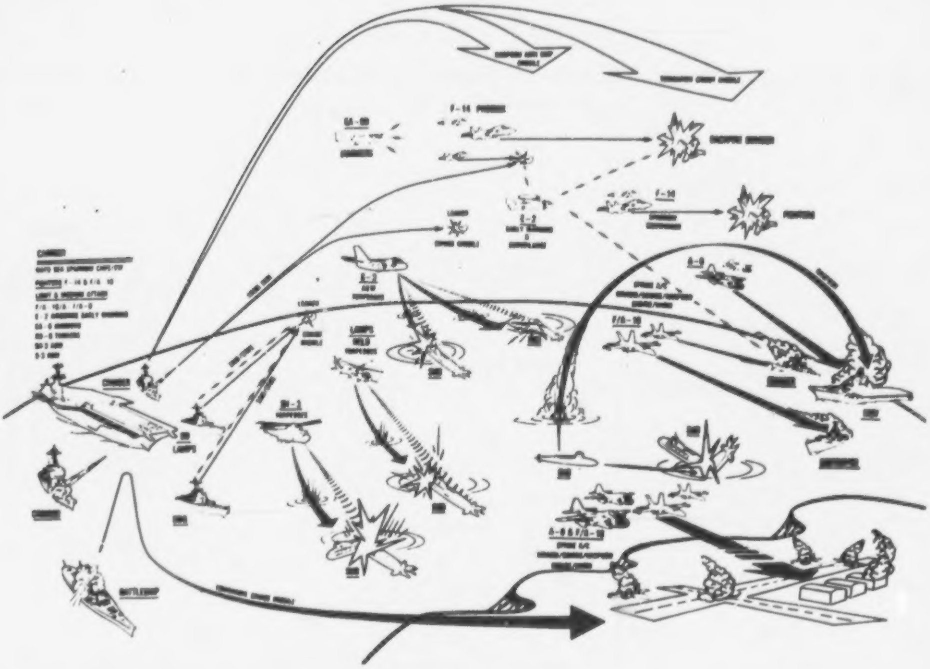
In peacetime, a battle group may be as small as one carrier and two surface combatants, such as a destroyer and frigate or a destroyer and cruiser. This is sort of an average peacetime battle group [indicating].

But, if we were to go to a general wartime conventional conflict, we would almost never be operating a single carrier battlegroup. They would have anywhere from two to four carriers using CINC warplanes as a guide. Of course, the size of a battle group is significantly larger for actually fighting in a conflict situation than our normal peacetime forward deployments.

This gives you an idea of the different types of airwings that we have today for different classes and sizes of ships. The *Midway*, of course, is a 40-year-old ship. We are transitioning that to an all F/A–18 wing. This gives you the mix of aircraft [indicating].

This would be the *Coral Sea* and *Midway* class.

The long-term plan, is to have anywhere from 8 to 12 of the new notional airwings. That is the mix of fighter, strike fighter, attack, antisubmarine, SAR, airborne early warning, and electronic warfare aircraft. This is the current *John F. Kennedy* wing [indicating] of which we will probably have from two to four. This is a heavy one for long-range operations, with F–14's and A–6's.



This is just a busy slide, specifically designed to be busy, to give you a schematic of everything that goes on simultaneously in the battle group. There are four dimensions: under surface, surface, air, and projection to shore.

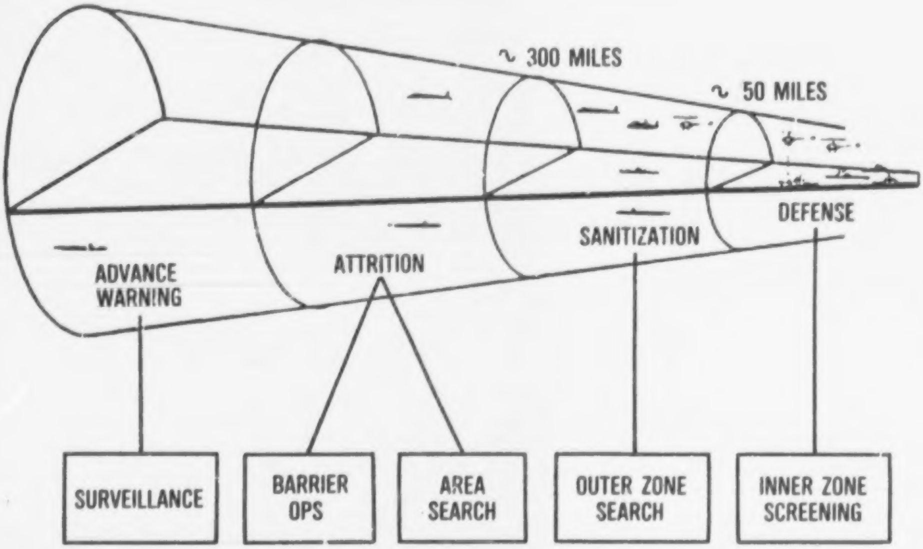
A battle group is a complex piece of machinery.

[Slide deleted.]

This slide gives one a slight misconception of what a battle group looks like, similar to what you see on the recruiting posters with the carrier and two destroyers, next to it, and so forth. There is this cluster of ships [indicating]. The normal, as we call it "4 Whiskey" configuration, covers roughly this much area [indicating] and controls an area about out to here [indicating]. This shows where the normal fighter CAP stations are. As you can see, it goes from Boston to Indianapolis, when you transpose it on to a map.

This is a typical operating formation for that kind of normal battle group operation.

ASW DEFENSE IN DEPTH


∿ 300 MILES
∿ 50 MILES
ADVANCE WARNING
ATTRITION
SANITIZATION
DEFENSE
SURVEILLANCE
BARRIER OPS
AREA SEARCH
OUTER ZONE SEARCH
INNER ZONE SCREENING

This just gives you a quick schematic of the kind of simultaneous warfighting and surveillance operations that go on constantly, 24 hours a day.

You hear in our budget presentations terms like the outer zone, the inner zone, Barrier Ops and so forth.

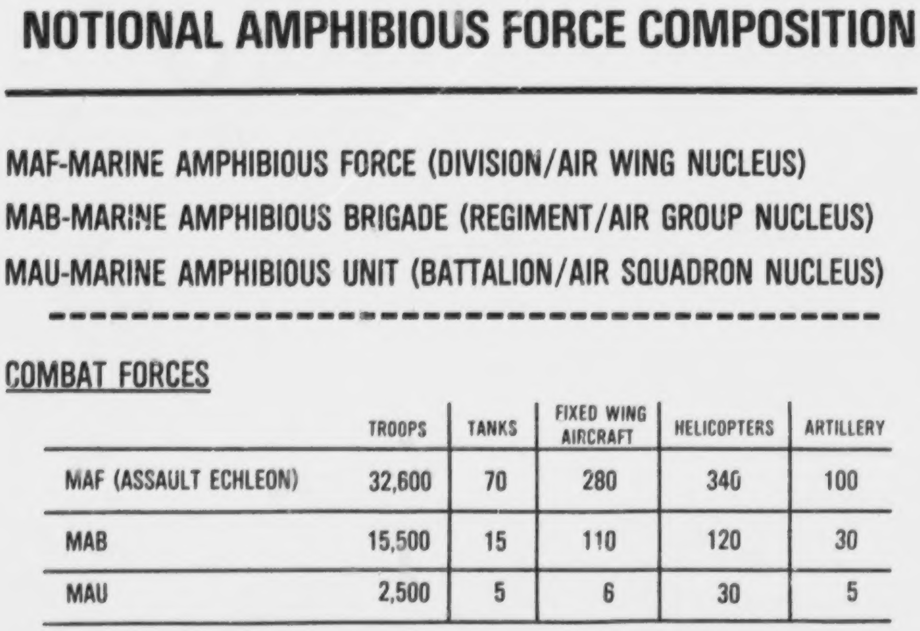
This shows you the kind of operations that go on the closer you get to the centroid of the operating group. Of course, the defenses get thicker as you move from way out with aerial and satellite kinds of surveillance, into the thick, close-in defenses.

[Slide deleted.]

This is the same thing applied to antiair warfare, the way we have the outer, long-range surveillance coming into the outer defense zone, and then the area defense and inner defense zones. The battle group has systems targeted to each of these different zones.

The closer you come in, the thicker your defenses get. The concept is a layered defense.

None of our systems have 100 percent PK, probability of kill. But the synergism of the overlapping layers is what the whole concept of defense is based on.



NOTIONAL AMPHIBIOUS FORCE COMPOSITION

MAF-MARINE AMPHIBIOUS FORCE (DIVISION/AIR WING NUCLEUS)

MAB-MARINE AMPHIBIOUS BRIGADE (REGIMENT/AIR GROUP NUCLEUS)

MAU-MARINE AMPHIBIOUS UNIT (BATTALION/AIR SQUADRON NUCLEUS)

COMBAT FORCES

	TROOPS	TANKS	FIXED WING AIRCRAFT	HELICOPTERS	ARTILLERY
MAF (ASSAULT ECHLEON)	32,600	70	280	340	100
MAB	15,500	15	110	120	30
MAU	2,500	5	6	30	5

This is our notional amphibious force composition. This is what a MAF would look like; 32,000 combat troops, with that many tanks, and with its organic aircraft, helicopters and artillery. We are carrying with it, in the assault echelon, 15 days of sustainability before the follow-on echelon arrives.

[Slide deleted.]

This slide has been downgraded to confidential. It is taken from the JCS warplans just to show how overcommitted our Marine amphibious forces are.

Of course, they cannot be everywhere at once, so it would depend on how the war starts and what the theater commanders and the Joint Chiefs of Staff decide as to where the allocation of resources should be. Every Marine unit is committed in some war plans to be several places at once.

Admiral Watkins. I think it is important to stop here a minute to talk a little bit about that because one of the problems we are going to have as a Nation if we are coming into conflict with the Soviet Union is the willingness to deploy forces early. All of our war games, all of our exercises that we have run, where we have the very best people playing the roles, either on the Soviet side or the United States side in our games, indicate that, in fact, we will not make the political decision to move forces early.

This is how important it is. In war gaming efforts at the Naval War College we have analyzed the impact of delaying the forward and early deployment of Marines and Canadian forces with the air echelon, and the Air Force F-15's to Norway.

A matter of a few days may make the difference of the loss of Norway to the Soviet Union. Timing would be extremely critical. Therefore, with that kind of fragility in any contingency plan, it is essential that we develop a concept that deals with the crisis buildup phase that insures that we are forward deploying forces. We are practicing that concept in exercises; for example in TEAMWORK 84 today off Norway. But we must get those marines over there, get them into a fighting mode, and get them out of the contingency plans for the defense of Iceland. We are working on that in the JCS, and the defense of Iceland has been given to the Army. Instead of having the Army come in at D plus 30, 30 days after conflict begins we are now saying that the Army must be mobilized to the point, say, in the 100,000 callup authority, to be able to quickly move into the Azores, Iceland, and the Aleutians. As a result, at D plus 30 we would not have the disruption and the need for heavy sea and air lift which is no longer available because it is now committed to the resupply of central Europe.

It is a very critical issue. It is one of those areas where we have competing requirements for the Marines. The Marines are in demand everywhere. They are the first to fight. So, therefore, we should be putting them into positions early, say at D minus 30, when we have a lot of warning, a lot of world unrest, a lot of indicators that we are moving toward conflict. That is the time to run some exercises and pre-position our forces into selected areas, not worldwide, but in small enough groups to move into areas that indicate to the Soviet Union that we have the resolve and the will to carry out the plan. Perhaps that is the final element of deterrence, so that we can avoid conflict if at all possible. This concept would be expensive, costing perhaps, close to $100 million in exercise funds that were not previously budgeted.

This whole concept of early deployment and movement of the Marines has become very critical. They are out there in ships. They are ready to go. They are ready to fight, and we don't want to have them tied down to policing roles when the fighting begins. That is included in this effort within the Joint Chiefs to straighten out, modernize, and make our contingency plans more dynamic.

Senator COHEN. In view of what you said, do you think it is a wise decision to have deployed the Marines for all that time in Beirut?

Admiral WATKINS. Well, I would defer to General Trainor to answer that.

[General Trainor starts to answer.]

Senator COHEN. You don't really have to answer that.

Senator KENNEDY. I have one question.

FORCE QUANTITY AND SEALIFT CAPABILITY

How do you relate the relationship between force quantity and sealift capability, or support capability, in this timeframe?

You have indicated that there is a flow line in terms of time, getting people over there. What is the variance between force and sealift and supply?

Admiral WATKINS. We have some recent analyses that the entire southwest Asia concern over the past 4 years, Senator Kennedy, which address that very issue—not just in southwest Asia, but worldwide. From these we have developed what are called time phased force and deployment data.

We probably have tested those more than any other in our defense exercises over the past 4 years. They have revealed serious weaknesses in our ability to meet the time lines in the contingency plans.

So, obviously, what we have to do is not only modernize our lift, but refine our time phased deployment force and data schemes so that they can be flexible and not rigidly tied to one scenario or another.

So, within the next year, we will have a whole new modernized deployment scheme that permits the kind of actions I was talking about earlier, where some elements that might be deploying after D-day to Europe would be deployed at D minus 30. And yet that would not disturb the latter time phased deployment system.

Now, when you get into this kind of concept, then lift does not become so critical as it is not required all at one time. You can begin sequentially to employ lift so as to minimize the gap between the needs and the ability to lift it to the theater.

We are working on that concept and feel that we will just about be there by the 1988-89 timeframe; with the nearly $5-plus billion that we put into sealift, and with what the Army and the Air Force are trying to do with intra-theater lift to move supplies from depots to the forward edge of the battle line.

This probably is one of the most aggressive, most positive contributions that Khomeini has made; to further energize us in this whole area of logistics support. But, still strategic lift is inadequate for the Nation as a whole.

We can meet our military requirements but the Nation is lacking in sealift for many other requirements, such as movement of strategic raw material and other commodities across the ocean all at the same time.

[Slide deleted.]

Mr. LEHMAN. In a peacetime posture, as the CNO has said, this is really the critical matrix from which any conflict will spring.

These are the friendly states and the friendly ships that we count on as part of our naval force. As you can see, the number is quite substantial. That is why we say that we can achieve naval superiority. It is quite a realizable goal even though we are not going to match the Soviets in numbers of combatants and other types of ships. We feel that taken together, our allied navies, along with our own 600-ship Navy, are clearly superior. They can do the task that we need them to do against the Soviets' ability to interdict. But, as you can see, and as every war we have been engaged in with allies has shown, all of these forces are not going to be there simultaneously. There will be a considerable time lag and variations in the allied navies joining into the conflict, depending on how it breaks out and where it breaks out. But, in any given area, all of our planning assumes a matrix of very efficient, good navies, like the Royal Navy or the Japanese Maritime Self Defense Force, in which our battle groups are designed to operate.

REDUCTION IN NAVAL CAPABILITY

Senator COHEN. Hasn't there been a reduction in the naval capability of our ally, Great Britain, because of the reduction in numbers of their ships, particularly after what happened in the Falklands? Hasn't there been a diminution of their capability?

Mr. Lehman. The Falklands demonstrated the extent of the erosion of naval force throughout the western alliance, that had taken place during the 1960's and 1970's. There, we had a navy deployed without any air cover, or any 3-D radars or any close-in defenses. That, hopefully, has been reversed to a certain extent in the United Kingdom's defense program since then.

But if it has not been reversed, at least it has been arrested. They still carry the 50 destroyer-frigate number and there has been more funding.

But I would have to say that with the exception of France, the trend in all of the allied navies is disappointing. They are not keeping up sufficiently with modernization, with the ability to interoperate with us. They don't have the defenses to deal with the threats the Soviets are deploying. But, as the Falklands also demonstrated, we have damn good navies on our side, with very good professional sailors. They have a long tradition and excellent capability.

U.K. DEBATE ON TRIDENT FUNDING

Senator Cohen. What has been the state of the debate in Great Britain with respect to funding Trident versus more of the conventional surface ships?

Mr. Lehman. Well, it is a debate that in many ways parallels the debate that has gone on here regarding the amount of money going into strategic versus conventional weapons. For this period of time, in which the building, developing and deploying of four Trident submarines, is looming as a larger lump to swallow for the Royal Navy than our own strategic expenditures, it is a legitimate issue there.

Senator Cohen. Do you have any sense of what is going on over there? Are they still fully committed to the Trident?

Mr. Lehman. We see no indication of any flagging in their commitment to the Trident program. It is going along very well.

Senator Cohen. I am only raising this in the context of what they are doing in terms of tradeoffs between the strategic deterrence and a cutback of their surface fleet.

Mr. Lehman. They have not modernized their fleet as they would have hoped to and should justify, given the commitment to ASW they have in the eastern Atlantic.

Senator Cohen. My understanding was that they were reducing their number of ships and were going to try to compensate with air patrols.

Admiral Watkins. Following the Falklands war, I think, Mr. Chairman, they backed off on that, at least partially, and restored the numbers of ships in their last budget.

Now what they do from this point on, we are not sure.

They are coming over here for discussion with us in the near future, and I hope to find out just exactly what is going on there because it is very critical to the alliance. They play a very important role in SLOC protection across the North Atlantic and into the Benelux ports.

So we were most concerned about the prospective demise of a part of the Royal Navy even before the Falklands war. That down trend has turned around, and now they are going to have to face the budget realities of the new Trident missile vis-a-vis their other forces.

I believe they will hang on to their strategic objectives, irrespective, and I think there is going to be tremendous British national pressure to build up the Royal Navy.

I really do think a very strong lesson has been learned there, and I cannot see them falling off the current numbers of 50 that the Secretary mentioned.

Mr. LEHMAN. Here is the maritime warfighting strategy. There are three phases to look at it in an analytical way.

MARITIME STRATEGY

Phase I: Transition to war.
Phase II: Seize the initiative.
Phase III: Carry the fight to the enemy.

The transition to war is perhaps the most crucial of all. How we position ourselves in the transitional phase, what Admiral Gorschkov calls the "battle for the first salvo" is critical. How we handle rules of engagement and the willingness of the political authority to deal realistically with the potential threat is crucial. In every crisis we get into, we see just how determinant that can be.

At sea, seizing the initiative is essential for reasons we will get to later.

Then, the final phase is war termination, to bring the conflict to a close as early as possible on favorable terms.

Senator COHEN. Would you distinguish between what the Admiral said about the war gaming—how we do not plan on taking the initial aggression or steps—with what you just said in terms of moving, of seizing the initiative.

Admiral WATKINS. It is very difficult to persuade the National Command Authority to call up the Reserves. It is very difficult to declare war. It is very difficult to read ambiguous signals and move forces based on those signals.

There is great consternation during the game on the part of the players about whether we are sending more of a deterrent signal by moving forces, or whether we are actually tearing down deterrence and encouraging adventurism.

That debate goes on and on.

Now it is a very realistic debate. I am not criticizing it. I am merely saying that the results have shown that the day we mobilize is the day we deploy, the day we commence conflict. It has developed that way in the games now for 20 years. I believe that this pattern of political inaction prior to receiving the first blow will be devastating in the next conflict.

Somehow we have to build up in this crisis period, the transition to war, in a new way. We have to think more aggressively in terms of the pre-positioning of forces. The rules of engagement must change to meet emerging circumstances. We now have rules of engagement out there in the Persian Gulf and the Eastern Mediterranean that are very essential. Those have been announced to the world, to Syria and to Iran. The zones have been set up because if we are threatened we have to respond.

So, as we approach conflict, it becomes much more difficult politically to allow a commander in the field to make his own judgment call as to when, for example, he is being targeted by an incoming missile with its fire control radar locked on. With all the other things in the world that are taking place to indicate that we are on the verge, does he allow the first missile to sink his ship, or does he sink the other? That is a very critical decision.

Senator **Cohen**. That is what I was trying to get at in terms of what is the line that is drawn between seizing the initiative and acting first.

Mr. **Lehman**. This [indicating] is post hostilities.

Senator **Cohen**. But I am not so sure that that is what the Admiral is saying. You are saying that it may not be possible to absorb that first shot and maybe we ought to take some action first.

Admiral **Watkins**. Not just that it may or may not be possible to absorb it, but it may be wrong for the Nation to do that if, in fact, we have a responsive system that is really alert to the information and warning indicators.

It turns out that information and warning indicators I think are very good, even in an ambiguous form, and we can make moves during those periods of time—not unlike what we are doing today—but as a Nation we to need to make the moves early. That, we found in our wargaming, is very difficult in any reasonable timeframe, like 30 days.

MARITIME STRATEGY
PHASE I

TRANSITION TO WAR

- WIN CRISIS/SMALL WAR
- DETER ESCALATION
- PREPARE FOR GLOBAL WAR
  - POSITION FORWARD
  - INCREASE READINESS
  - DECREASE VULNERABILITY
  - AVOID MALDEPLOYMENT
  - HUSBAND RESOURCES
  - MAXIMIZE WARNING TIME
  - CEDE NO VITAL AREA BY DEFAULT
- WIN CRISIS/SMALL WAR

Mr. LEHMAN. The first phase, the transition to war, is the most crucial. In preparing for that phase there are certain critical positions where we must have forces. We have to get the readiness up. We have to move from the peacetime posture.

You are all familiar with the cross-decking issue where, when a carrier comes into the Mediterranean, we often will cross-deck built up arms from the outgoing carrier over to the incoming carrier.

A lot of that makes sense in peacetime. Because even if all of your stocks are full it is just very inefficient to build up a Harpoon missile at Yorktown, carry it to the Mediterranean and then bring it all the way back and tear it down and put it back in the stocks. Once you get it built up, it is far more sensible to keep it built up and in theater. But, if you moved, in the transition phase, to an alert status, then all of your carriers have to have those Harpoons. You have to deal with that readiness need, fill the squadrons up, get the repairs done, and the spare parts lockers you have to do that have to be ready to transition from a peacetime operating posture to a wartime posture.

The other issues involved here will be gone into in more detail by the CNO.

[Slide deleted.]

Again, phase I. This is just another schematic to show where, under the CINCS' plans, things have to get to, plans before the war starts, from their normal peacetime deployment.

This is a critical problem which is much less of a problem for us in the naval service than it is for the land services. If you tried to get all of those mal-deployed Netherlands units into their FEBA positions, that is very different and much more than moving your carrier group from the west coast to the Pacific.

[Slide deleted.]

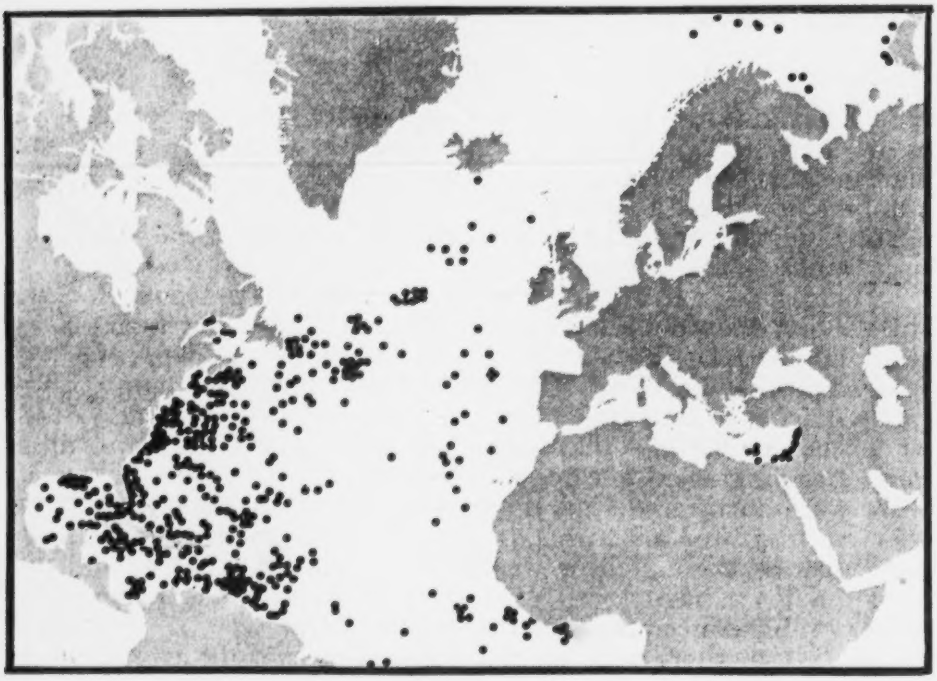
This is not a very good graphic, but it is drawn directly from the latest theater CINCS' concepts of operations.

This shows where and how many carrier battle groups they feel they must have in each area to carry out the tasks that are currently assigned to them in the war plans.

So, as you can see, this is what is based on the CINCS' war plans right now.

Again, this is phase II, seizing the initiative after the war has begun.

MERCHANT SHIPS SUNK BY U-BOATS
JANUARY - JULY 1942



This is just one illustration to show how critical going on the offensive at sea is.

This just shows January to July in 1942, when we had virtually lost the war. These are merchant ships lost in just this one phase, in the Caribbean and the North Atlantic, to a total of 57 German submarines—only 57 submarines.

This is strategic sea lift. This is Army tanks. This is the aircraft and ammunition that most experts believe had even three-quarters of this not gone to the bottom, the war would have ended at least a year to a year and a half sooner.

But, unfortunately, we had no way to prevent it at that time, because we had not gotten into a fully mobilized position. We had no air cover. We had insufficient destroyers to convoy. And so, just 57 submarines were allowed to prey on our sea lanes.

If that were to be the case this time—now—I hasten to add that in 1941, we were building one merchant ship a day in the United States. The day of Pearl Harbor, we were fully mobilized in ship building. We were doing even better than that in the year 1942 and we could not keep up with this attrition.

Today we have one merchant ship under construction in the entire United States, for the whole year, and we have no attrition.

So it is all very well for some critics to say that the Navy should stop worrying about new destroyers and more aircraft and buy sealift to move the Army; but it does not make very much sense to move the Army if they end up there [indicating]. We have been unable to force the Soviets into a defensive posture by moving out early to show them that they have to worry about protecting their assets, and use their attack submarines here [indicating], rather than here [indicating].

ESCORT AND COMMERCIAL SHIP RATIO

Senator **Cohen**. What was the relationship, the ratio between the escort ships—the cruisers and the destroyers—and the merchant marine ships that were sunk, the commercial ships? What were the numbers, compared to where they are today?

You said that we did not have enough to protect the merchant cargo lanes.

I would suspect it was a lot higher then than it is today. You are still talking about building up to a 600-ship Navy. How many Navy ships did you have in the inventory in 1942?

Mr. **Lehman**. In early 1942, we did not have that many. They really started to come in in the latter part of 1942 and early 1943, when the combatants that were laid down just before and after Pearl Harbor started to come into the force.

We were hurting. We had no escort carriers. We had virtually no effective maritime air through most of this segment here [indicating]. Most of the air cover was basically just coastal. We did not have what we have today, and that is an attack submarine to counter submarines preying on merchant ships.

I think that there were only two submarines sunk by other submarines in the whole Second World War. Isn't that right?

Admiral **Watkins**. Yes, and that was on the surface.

Mr. **Lehman**. And they were on the surface.

Today our attack submarines are primarily focused on their submarines. That is why offense, with our submarines first pushing or forcing them into a defensive posture, is so critical.

SUBMARINE RATIO

Senator **Cohen**. What is the ratio between our attack submarines and their attack submarines?

Mr. **Lehman**. In nuclears, they have 116 nuclear attack subs and we have 94. They have about 150 diesel electric subs, which are useful to them in blocking our convoy routes putting them there as floating mines if you will. The diesel electrics are just as much a threat to an unescorted group today as they were in 1942.

So, their diesel electric threat is a threat to us.

Senator **Cohen**. What are the numbers?

Mr. **Lehman**. About 150 on their side and zero on our side. But there are about 150 allied diesel electrics. So we are not that far away from rough equality in numbers, given all of our allies. This includes the Japanese, the Australians, and all of the Europeans.

If they are all generated and at war, then they are part of our force.

Admiral **Watkins**. I think it is important to know that is the way we play the war game in peacetime. Because of our sophisticated systems, we can act as the water manager for the allies in submarine operations and we do that. We know where each of our submarines is located. We control them to avoid mutual interference. We have communications links established. We have intelligence exchanges established. We know what their contingency plans are for wartime. They know ours. The missions are clearly defined, and there is no doubt in my mind that they are going to be very effective at the choke points of the world, which happen to be the exact same choke points that we would identify were we to have our own diesels and have to go it alone.

In other words, if we had a diesel submarine force the same size as our allies, 140 submarines of high quality, then we would position them exactly where they are, in the Skagerrat and Kattegat, down in the Straits of Gibraltar, in the Straits of Sicily. We'd be in all the right spots, down in the Straits of Malacca and throughout the world. That is where they are today. That is where the Japanese will be. That is where the United Kingdom and the West Germans will be, in the right spots. The Norwegians will be in similar locations.

We have the optimum relationship with the alliance in that they have the forward deployed diesels at the choke points doing the sea denial roles against the Soviet Union. That means that we can project our submarines forward into the areas where the diesel submarine cannot really penetrate.

The combination of the two forces that the Secretary mentioned earlier are absolutely critical to the equation and the balance, as to whether or not we can win the war at sea.

Mr. **Lehman**. Let me put back the earlier slide, merchant ships sunk by U-boats, for you.

There is one little point that I want to touch on here, and that concerns what is going on in Cuba.

Senator **Kennedy**. Can you tell us when they moved toward that type of deployment, and do you have any conflicts on the demands that these countries want to protect what they consider to be a more limited national interest, rather than a total allied interest?

Admiral **Watkins**. Senator, my observations have been, and we have operated with them for many years since World War II, and very aggressively in the last 10 years, that the commitment to the alliance is a very serious one for them. I do not see them dropping this commitment for other, you might say regional, conflicts with neighbors, if that is what you are referring to.

I have never seen that in any of the war games, in any of the exercises we have run, or even any of the back room discussions.

We have been very open about that because certainly we are not interested in the Spanish Navy being focused on an invasion from Portugal. Our allies are willing to talk about those things very openly. Our feeling is that their commitment is real and they are going to carry it out as long as the national leadership in their countries want to play the game. This includes France.

You always have that "if," but there is not any question at the military to military level where those forces will be in wartime.

Mr. **Lehman**. Notice the cluster of sinkings in the Straits of Florida, the Straits of Yucatan, and the Windward Passage. It would be exactly the same problem today as it was then because today, 85 percent of all Army logistics has to come out of the gulf. You notice the cluster around New Orleans and Galveston. This is crucial to the resupply of Europe, or to anywhere, to the Army, because here is where they embark for the resupply of the units committed.

It has to come through the 60-mile Straits of Florida or the 40-mile Straits of Yucatan. That is why the Soviets have been so smart in the way they have built up the Cuban Navy. They just got their third new Foxtrot diesel electric, which would be very good for sinking merchant ships trying to get through those straits, until we could neutralize them.

They have about 50 patrol, cruise missile, and torpedo boats, throughout the bay and estuaries around Cuba. It will be a real problem to get merchantmen moving through this area, in the early stages of a conflict, until Cuba is taken care of either politically or militarily.

I just wanted to make that point. The Soviets have been very intelligent in the way they have used their resources in Cuba on a maritime basis.

So, seizing the initiative is essential.

We have to move up north of the GIUK gap. We have to control the Norwegian Sea and force them back into the defensive further north, under the ice, to use their attack subs to protect their nuclear missile submarines, to use their attack subs to protect the Kola and the Murmansk coasts, and similarly their Pacific coast as well.

If we try to draw a "cordon sanitaire" and declare that we are not going to go above the GIUK gap or we are not going to go west of such and such a parallel, then, obviously, they have the capability to use their attack subs offensively against our SLOCS.

[Slide deleted.]

This is one issue that people keep raising, the GIUK gap versus the North Cape. It should be clear to everyone that if the NATO treaty means anything, it means that we have to protect and to hold Norway. The minimum reinforcement plans require both the Marines and the ACE mobile force to move by sea. They all have to go by ship, to Norway, after the conflict breaks out. If we allow the

Norwegian Sea to be controlled by the Soviet Union, Norway is untenable.

That is one important issue.

CONTROLING THE NORWEGIAN SEA

Senator **Nunn**. Mr. Secretary, I have a question on this point.

The big question is not whether we try to control them, but with what forces do we try to control them, and whether you really are putting those carriers up there from the point of view of protecting that area and sea control, or whether you are going to take the battle to the Soviet homeland, which is what you had said.

Nobody is disputing the importance of that area, but the assumptions that we heard before, that we would not begin to put carriers up there—we heard this from the naval testimony, the military testimony—were unless we had control of Greenland, Iceland, and the United Kingdom. Of course, then the logical question is if you have control of that, why don't you use land-based air to a much greater extent than what you talked about.

I found a great disparity between your view on this particular point and that of the uniformed Navy.

Mr. **Lehman**. I would be interested in your pointing out what that disparity is, because I have not been able to find it.

Senator **Nunn**. I have not had an admiral yet who told me he would be willing to put those carriers on a mission to go right out to the Soviet homeland in that area.

Mr. **Lehman**. Senator, you keep saying that, but when did you hear me say it?

Senator **Nunn**. I heard you say over and over again that we were going to go after the Soviet naval ports and so forth with our carriers.

Mr. **Lehman**. I don't think so. I know that Bob Komer and others have said that I have said that, but I have looked in vain for where.

Senator **Nunn**. Why you have told me that.

I have heard you say it in hearings.

Mr. **Lehman**. I would be interested in seeing the transcripts of that. What I have said is, we cannot control the Norwegian Sea, if we cannot operate carriers there. In order to put forces into that area, we have to provide air support for them. So, we cannot control that area without carriers in the subsequent phases of the operations. I think that speaks for itself.

I have found no admiral that disagrees with me on that, except for those like Stan Turner and some others.

The fact is that I have never said we were going to steam carriers up there to lob A-6's into the Kremlin's men's rooms, as Barry Goldwater says. What I have said is that we have to go on the offensive early. We have to send submarines up there. It has to be premised on land-based air, substantial use of P-3's and Nimrods operating out of Iceland and the U.K. Our submarines have to go and nullify the Soviet submarine force before we can send any surface ships, certainly before we send the Marines up there in amphibious craft. And, once we have secured that, we have to be able to use carriers in the area to provide air support to the forces there, so that they can do those tasks that are necessary to secure Norway.

Now, to take that one step further, for us to say that we have to prohibit any strikes for mining or for closing the naval bases and air bases in the Soviet Union seems to me nonsensical.

Senator NUNN. It is a question of what forces you do it with.

Your assumptions are that we control the United Kingdom, Norway, and Greenland. The question is do you put those kind of assets, the carrier assets, right up there in the heart of the Soviet area when you could do it with land-based air.

Mr. LEHMAN. How could you do it with land-based air? The range of most tactical aircraft in the U.S. inventory is about 300 miles.

TACTICAL NUCLEAR WEAPONS

Senator NUNN. What are you going to do if they start popping tactical nuclear weapons in that area of the world with your huge carriers in there?

Mr. LEHMAN. Well, what do you think is going to happen to our land bases when they start popping tactical nuclear weapons?

Senator NUNN. Well, I think there is a lot of difference between starting a land-based or sea-based attack.

Mr. LEHMAN. I think a carrier will survive a lot longer than, for instance, Ramstein, when tactical nuclear weapons are raining down.

Senator NUNN. Well, I have found there is a heck of a lot of difference between starting a land nuclear war and starting a sea nuclear war. If the Navy is so foolish as to put a whole group of carriers together and throw them right toward the Soviet heartland, if you put a huge number of your whole resources in there, why one theater nuclear weapon could wipe out your carriers and wipe out a substantial part of your fleet with no collateral damage at all.

If the Soviets ever were going to use tactical nuclear weapons, it seems to me that is such a target that they could not avoid it.

Mr. LEHMAN. Senator, there are far more valuable assets already ashore, and you have to defend them. The ability to put a nuclear weapon on a carrier, or a cruiser, or an amphib that moves at 30 knots is considerably more difficult than putting one on a land base that does not move at all. So, if the nuclear threshold is crossed, it is going to be a lot bigger problem than just worrying about the survivability of the carrier. Those carriers are going to be just as able to be hit by nuclear weapons if they are below the GIUK gap as if they are above it.

Senator NUNN. What I am saying to you is if you put all those resources together into one task force and head right toward the Soviets very strategic targets in that area, I think the very tactics you are describing will lower the nuclear threshold and make it much more likely that that nuclear threshold will be crossed, because you will have such a huge, lucrative target. It will pose such a threat to them that I think it will be almost irresistible.

Mr. LEHMAN. It is entirely dependent on how and when the operations are taken.

I think the Marine amphibious force is a far more juicy target than a carrier task force. If you think we can keep Norway without using resupply vessels and amphibs and other ships, then you have not looked at the war plan. And if you think we can defend them more easily than we can defend a carrier, then I don't understand you.

How are you going to get your forces to Norway?

Senator NUNN. Well, the forces landing in Norway are essentially to defend NATO territory.

Mr. LEHMAN. And the Soviets won't shoot at you, is that it?

Senator NUNN. You are not going to knock out any Soviet naval bases with a Marine landing force. I haven't seen any war plans that puts the Marines ashore in Russia.

Mr. LEHMAN. Are you suggesting that they won't shoot at the amphibs?

Senator NUNN. No. I am suggesting that that is not anywhere as lucrative a target and is nowhere nearly the threat to them.

Mr. LEHMAN. But you are saying that you want to send the amphibs without carrier cover—that's what you're saying, right?

Senator NUNN. No. I'm saying that your plan to take the carriers in and attack the Soviet land base——

Mr. LEHMAN. Now where did I say that. You keep saying that I said that. Komer keeps saying that I said that.

Senator NUNN. You told me that in my own office. Over and over again I have heard you say it.

Mr. LEHMAN. Senator, I said that we cannot preclude the capability or disavow the capability to hit their forces that are threatening our forces with carrier air and land-based air.

Senator NUNN. Well, I think you have changed a good bit, and I am gratified, because what you are saying now is not the same thing I heard before. I think you are evolving in the right direction.

Mr. LEHMAN. Senator, I have not changed my tune since I came into this job. I have not changed it one iota.

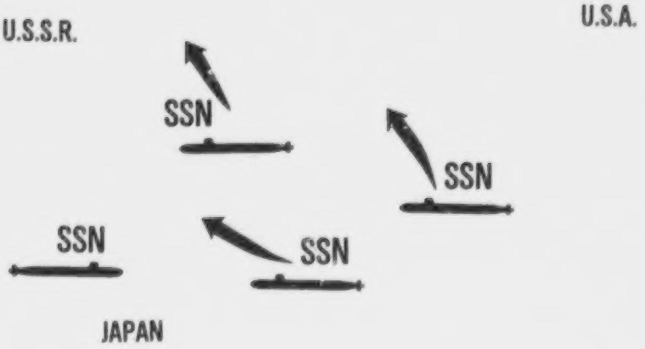
Senator NUNN. Well, then, my hearing is bad. I am usually pretty good at that.

Mr. LEHMAN. I would be interested in seeing those citations.

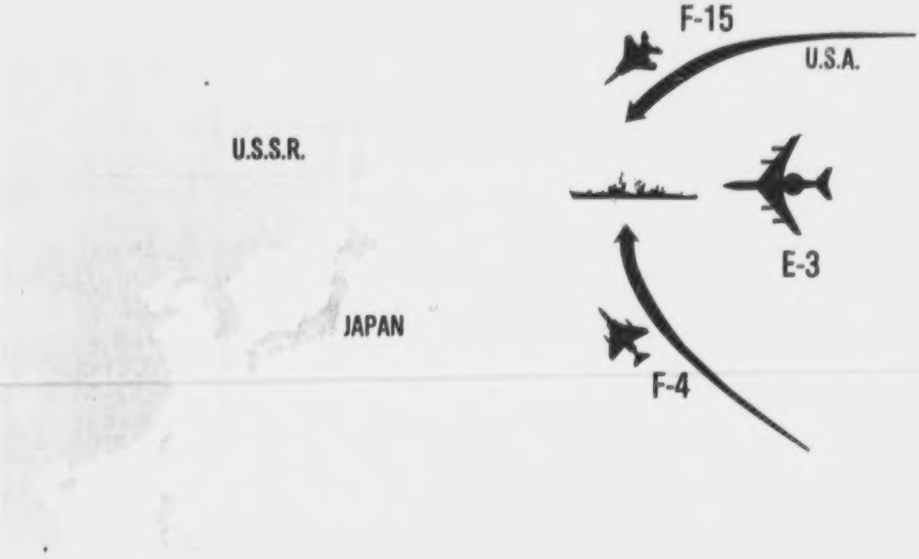
Senator NUNN. Well, I know what you said in my office. I know what you said to me. I don't have any doubt about that. I have it up on the map, and you showed me exactly what your plans were. I do not agree that you haven't changed, but I am gratified that you have changed.

Senator COHEN. Well, as long as we are all at the same point and are in agreement, maybe we should proceed.

Senator NUNN. I would like to see the war plans, though. I think that would be interesting.



Mr. LEHMAN. Similarly, this is the same phase transposed to the Pacific: forward deployment of the SSN's, moving them forward and putting the Soviets on the defensive in the first phase.



Similarly, as we did in RIMPAC we have been making maximum use of land-based assets, AWACS, F-15's, KC-10 tankers, and F-4's. This has been a key aspect, during the last 3 years, of the integration between the Air Force and the Navy that the CNO will speak to in some detail. That integration is now an essential part of the CINC war plans and has proven to be very successful in the exercises where we have used them.

[Slide deleted.]

Phase II is seizing the initiative.

Again, this is more readily illustrated and in more detail when we talk about the exercises theater by theater.

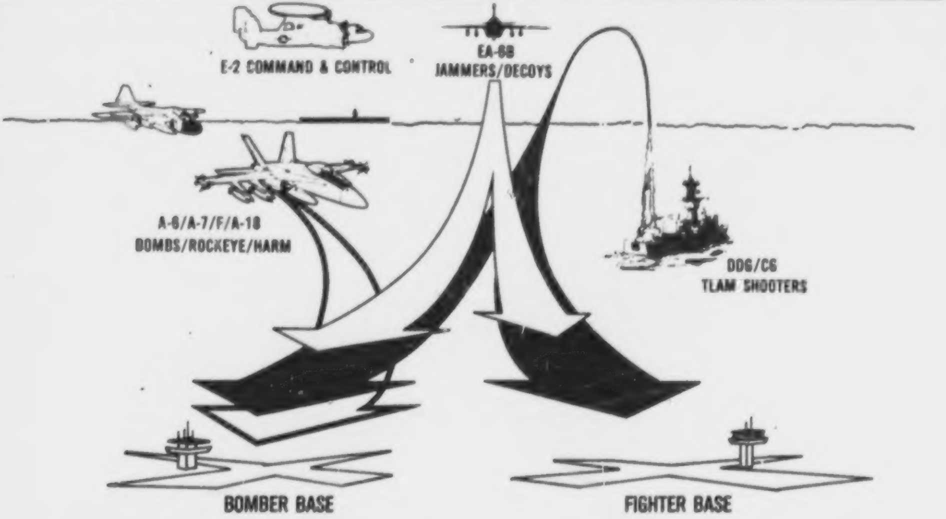
[Slide deleted.]

This demonstrates the use of amphibious forces, the Marine amphibious unit, MAB or MAF, in this phase of the war, depending on where you put them. They will be used for SPECWAR operations, reinforcements and seizing key terrain.

[Slide deleted.]

Again, war projection options are shown. These are derived from various exercises and war plans. We could go into them in more detail.

COMBINED ARMS STRIKE MISSION



This is drawn from a war game that was based on some fairly interesting intelligence. It is the use of a combination of land-based and carrier based air to strike the Soviet Union, to catch the Backfires on the ground. This one is based on Alekseyevka. In the war game, the exchange ratio that resulted from the computer analysis looked quite favorable. The fact is that Soviet naval bomber bases are not hardened. They are revetted, but not hardened, quite lucrative targets for both carrier and, in this case, land-based strikes.

[Slide deleted.]

This is a schematic of a projection mission in Central Europe based on the use of the Tomahawk. At most, some 70 main operating bases within the Warsaw Pact are within land-based Tomahawk range from the periphery of Europe, including the Mediterranean, the Bay of Biscay, and elsewhere.

[Slide deleted.]

This is another schematic showing the strike ranges of a DDG-51, a 963 or an Aegis cruiser with VLS, from a standoff point out to here [indicating], they are capable of attacking these bomber bases with conventional Tomahawks.

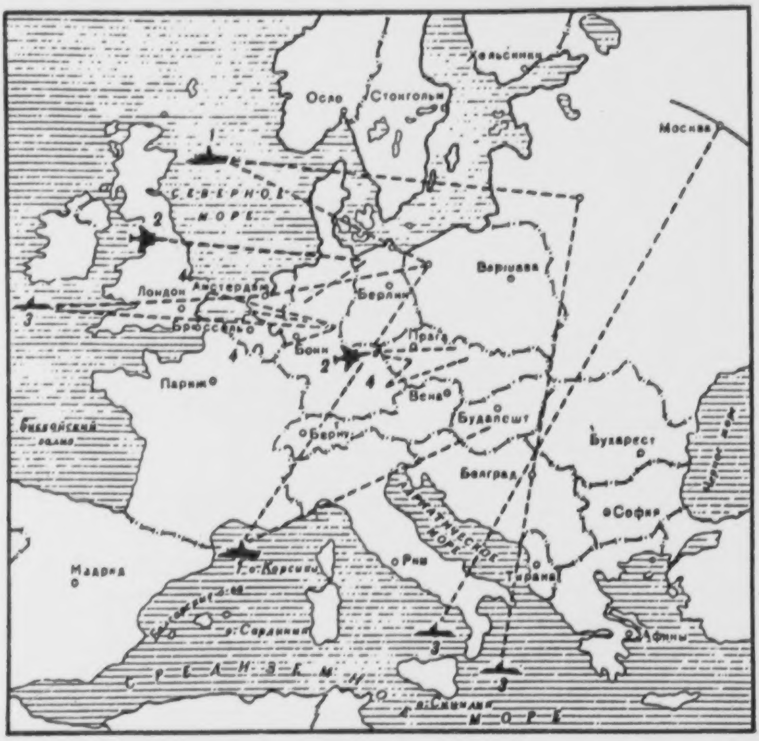
[Slide deleted.]

TOMAHAWKS

This shows you the current plan in the budget for Tomahawks at sea including the SSN–688's. We now have 688's deployed with Tomahawk. With the 637 class submarines and eventually CG–47's, the 963's as you can see, you will have quite a few Tomahawk launchers at sea. We increase the number every year from now on.

Right now, we have them on four SSN 688's and one battleship.

SOVIET VIEW OF TOMAHAWK


Хельсинки
Осло
Стокгольм
Москва
1
СЕВЕРНОЕ МОРЕ
2
Варшава
Лондон
Амстердам
Берлин
3
Брюссель
Бонн
Прага
4
2
4
Париж
Вена
Бискайский залив
Будапешт
Берн
Бухарест
Черное море
Белград
София
Адриатическое море
Мадрид
о. Корсика
Рим
Тирана
о. Сардиния
Афины
3
3
СРЕДИЗЕМНОЕ МОРЕ
о. Сицилия

This is a Soviet view of Tomahawk. The fact is that it is not just the carriers that the Soviets have to worry about now. Because, we now have many deployed ships that, from a strike point of view, are a potential threat to the Soviets in a wartime situation.

All of our destroyers and eventually, all of our cruisers and all of our attack subs will be potential Tomahawk shooters. This will complicate tremendously the targeting problems of the Soviets. They now have to worry as much about a destroyer as they do about a carrier from the point of view of transition to strike operations.

The final strategy is to carry the fight to the enemy and bring the war to a close. It is that ultimate end around which we have to do all of our planning, to give the Soviets an incentive to come to terms and terminate hostilities.

[Slide deleted.]

This, again, is a schematic use, in this final phase of carrier operations, of Marine amphibious assault for striking the Soviet homeland, their military assets, and their bases, mining their harbors, and giving them every incentive to——

Senator NUNN. Mr. Chairman, may I ask one more question at this point?

Senator COHEN. Sure.

Senator NUNN. Now, if that does not show the Navy carrier attacking the Soviet homeland, what does it show?

Mr. LEHMAN. Senator, I said that in the first phase, that we never intended to steam carriers up to strike the Soviet Union in the early phases of the war. However, I also said, and have never changed my tune, that we must never put our theater commanders into a position of giving the enemy sanctuaries, by saying that we are never going to do this under any circumstances.

We must have the capability to do it. The Soviets are very vulnerable there. They have very ill-defended, high value assets that we have the capability to strike. Every theater commander ought to be able to think about using those capabilities to bring the war to a swift close on favorable terms.

PHASE I TO PHASE II TIMEFRAME

Senator COHEN. Mr. Secretary, what is the timeframe in going from phase I to phase III?

Mr. LEHMAN. No one has tried to put a timeframe on it because of the inherent unpredictability.

Senator COHEN. But you have to have some parameters on it because you have some real reinforcement problems and I assume some other logistical difficulties. You just can't have it open-ended just from day 1 to day 60 or 90.

Mr. LEHMAN. Again, I want to emphasize that our whole approach to strategy is not to try to fight the war for the CINCs. It is simply to provide for them the kind of capabilities, training, and planning for options to fight the war on their terms in whatever the timeframe might be.

War is inherently unpredictable, one can't easily determine how it will break out or how long it will take, for instance, to nullify the submarine force in the Norwegian Sea. That is a tough area to operate in. It may take a week or it may take a month or 3 months.

Senator COHEN. The reason I asked that question is it may help to clarify some of the questions that Senator Nunn has with you and statements that you made in the past about taking the battle to the enemy. It depends. If it comes in phase I, then it falls into Senator Nunn's area of real concern, as to whether we have the capability or the wisdom. If it comes in phase III, which is after you have neutralized their various submarine forces and have them bottled up and now on the defensive back home, that is something else.

Mr. LEHMAN. I believe that from the very start I have been consistent in saying that I am not going to try to tell any CINC how to run the war. I don't know when we should use it. He has to determine that but he should know that he can use the capability when he determines that he needs it.

Senator COHEN. But you would tell the CINC not to put the aircraft carriers up there, in phase I?

Mr. LEHMAN. No. It is really up to him, and, of course, the National Command Authority.

Senator NUNN. Mr. Chairman, you can't find a CINC who would ever do that. I haven't. I have had Harry Train in here asking me that very thing, and this chart makes exactly the point I am talking about, Mr. Secretary.

Admiral WATKINS. Senator Nunn, I think maybe I could talk about that during my portion.

Senator NUNN. He said he would not think about doing that.

NORTHERN WEDDING EXERCISE

Admiral WATKINS. I can address that in my presentation.

When we do the Northern Wedding exercise, for example, we essentially do sequential operations to roll back the enemy's defenses. We know how to do that. We know when to make our moves up into those regions. We have to know how effective the SSN surge would be against the Soviet bastion force around the SSBN's. It is very critical to force them back up in there. That is going to be watched very critically.

We will be positioning our forces down south of Iceland initially to rendezvous there and to ensure that we defend Iceland, and we will move those forces early to Norway, including the Marine amphibious brigade, the F-15's and the Canadian forces. If we move them early, move them right on schedule or before, then we have the chance to mount a synergistic effort—which I will illustrate—between Norwegian forces, U.S. forces, U.K. forces in the south, the defensive forces in Iceland—including AWACS, the F-4's and hopefully the F-15's in time—and then the Navy battle group forces.

That is a powerful combination of force to deal with the Soviets and I would like to tell you a little later how we would do that and roll back their defenses.

We are going to pick our time, pick our opportunities to go up there. But we are going to be very aggressive about it.

We think we could do that, but we can't tell you the time. I can't begin to tell you because so much of it surrounds the discussion when you were not here earlier, of early movement of forces and placing them in critical positions so that we have an opportunity to use our F-15's out of Bodo and the Norwegian F-16 aircraft to help us in the sea control mode.

I will show you an exercise where I think we feel fairly comfortable that we know how to move those forces up at the right tempo, so that we do not rush off willy nilly doing something that certainly we are not in actuality going to do. No CINC will do that.

Senator **Nunn**. Well, I would submit that by the time those carriers in one big group, as one lucrative target, start pulling close to the Soviet ports of crucial interest, if a nuclear war has not started at that stage, it certainly will by then.

Admiral **Watkins**. Senator Nunn, one carrier battle group takes up 56,000 square miles. The neighboring one is 250 miles away. He also takes up 56,000 square miles. The other is off in another direction, another 250 miles. This is not a World War II kind of disposition. These dispositions cover an area equivalent to all of central Europe.

So we are not talking about ships that can be taken out with nuclear weapons in some kind of barrage attack. All the studies have shown this thinking to be unsound. The last administration used to talk about them being taken out with nuclear weaponry. It cannot be done, even statistically.

Most of the good analysts will tell you that tactic would be a loser when you have the disposition of forces that we are talking about.

It is not carriers all bunched together.

Senator **Nunn**. How are you going to attack the Soviet home port without having them close enough to launch your airplanes?

Admiral **Watkins**. Again, I would like to put that in the context of sequential rollback of the Soviet defenses, so that we can get to the point where that is possible. That means we must cement Norway, cement Iceland——

Senator **Nunn**. But I am not talking about rolling back. I am talking about the last part on the chart up there, when you are attacking that home port of the Soviets. Are you going to have them spread so far that you can't even launch and get your planes there?

Admiral **Watkins**. Oh, no. By that time we will move those forces forward, Senator. We are going to move them up. We are not going to sit there below Iceland.

Senator **Nunn**. Well, you just gave us the hypothetical example about them being spread out.

Mr. **Lehman**. Senator, you will see that in our exercises, we are now regularly running strikes 1,500 miles from the carrier with the A-6. We have integrated the Air Force into naval operations. So, there is a tremendous amount of flexibility as to where you launch and where you recover.

We think the exercises show that you can do it.

Senator **Nunn**. Well, Mr. Chairman, I have said enough on this. I just would submit that that chart is exactly what we have been hearing.

Mr. **Lehman**. That chart is exactly what I have been saying for 3 years.

Senator **Nunn**. I agree with that. That is what disturbs me.

GLOBAL WAR

LIFE MUST GO ON IN WARTIME

- VITAL RAW MATERIALS COME FROM OVERSEAS
- POL FROM SWA CRITICAL TO JAPAN/EUROPE

Mr. **Lehman**. Well, one aspect of a global war is that life has to go on. The commerce, the resources, and the economy of our country still are dependent upon commercial sealanes.

So, quite apart from all the planning about resupply of the military, we still have to keep these sealanes moving, just to keep the economy going.

[Slide deleted.]

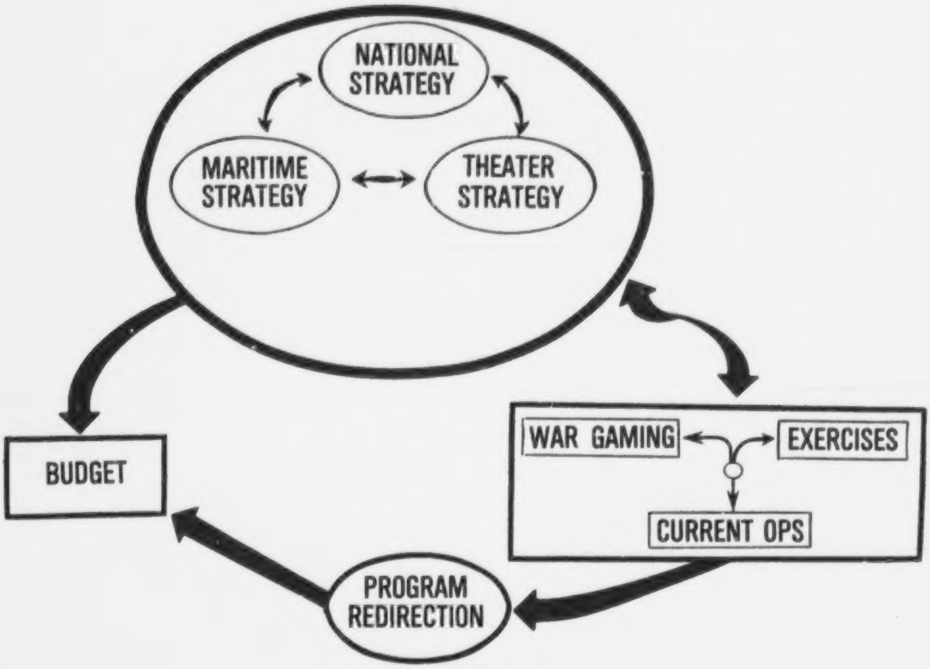
War termination, which I have already talked to, is shown here, to bring it to a close on our terms.

Strategy Refinement and Validation

Fleet exercises;
Amphibious exercises;
War gaming;
SSG.

Now, I would like to turn the discussion over to the CNO at this point to talk about how we tie strategy in with the fleet exercises and the amphibious exercises that we run year-round. He will discuss war gaming, where we take the experiences from Ocean Venture or Teamwork 80 or whatever, put them into the computer, and run them through with variations. We use the results in both the annual war game and the subsidiary war games. We also have a strategic studies group that we have developed to bring together the operators fresh from the fleet and give them the luxury of spending a year at the war college to contemplate in tranquility the lessons of their recent operations. And it has worked extremely well.

So, Admiral, why don't you take over.



Admiral WATKINS. What we do is take the national strategy, convert it to the maritime strategy under the defense guidance system, and then through our war gaming and through our exercises in real world situations test it on a global basis. We try to formulate not only the programmatic aspects of our budget submission but, more importantly, the strategic and tactical employment of our forces.

So, we can see from all of these events that we in the Navy and Marine Corps are uniquely involved in a wide range of worldwide exercises from which we can extract an awful lot of information that can help us get ready for potential conflict with the Soviets. Certainly our exercises add to our deterrent posture if he sees us as a credible force.

Now, last year we were involved in dozens of exercises, the Navy and Marine Corps, worldwide. These exercises are conducted with our major allies multilaterally and bilaterally, and they involve all kinds of sophisticated operations. I will talk about a few to give you an idea of what we do.

These exercises are extremely important because, unlike any other service the Navy runs eyeball to eyeball with the Soviets daily, either in the air, on the surface or under the water. We share common territory in the international waters of the world.

So, we have a very special opportunity to view first hand the Soviet war fighting capability.

These exercises, then, bring out the Soviets and in many cases the Soviets actually act as our target forces, our orange forces, as we call them. They provide very effective exercise services to our forces because we can really see what we are up against.

This gives us greater confidence as we move into the war scenario events.

Senator **Cohen**. Do you ever have any suspicion that they may be employing the "Jim Brown technique?" He always used to get up very slowly after getting hit and you never knew whether or not he was hurt. Is there any indication that the Soviets, when they partake in surveillance of some of our activities are only showing you half or a quarter of what they have?

Admiral **Watkins**. No, sir. [Deleted.]

So we have enough feedback from our intelligence network today to know exactly how we are doing relative to them, and that scenario that you just ran through is not applicable to the Soviet mentality.

[Slide deleted.]

WAR GAMING

War gaming, then, is one of the critical test beds that we use to check our maritime strategy.

As Chester Nimitz indicated after World War II, he never conducted a campaign in the Pacific that he had not already run in a war game. I think that is a very good lesson for all of us to take aboard. We have the sophistication in the war gaming centers today to be able to play very sophisticated games and test our contingency plans and give us a base knowledge. This precludes a newly appointed commander coming to command of a fleet and doing something with that cherished group of resources that has already been proven wrong.

So, the war gaming center is not only a way to test our plans, but it also serves as a data base for lessons learned.

We don't allow any exercise to take place at sea today that we have not war gamed. And now, with the $18 million war game center at Newport, linked to the fleets at Norfolk, San Diego, and Pearl Harbor, and closely controlled by the naval postgraduate school software center, we can begin really to work these combined parts. Remember, we are talking not just about the Navy data base, but we are talking about employing the McClintock model that comes out of the Air War College and the Army War College data base as well.

So, because we have combined services represented at each of our war colleges, we are now coupled together in a much more synergistic way running these tests.

We fight every war with all forces and if it is a scenario in Central Europe, then, of course, what we try to do is maximize the leverage of the maritime strategy in countering the Soviet strategy and affecting the outcome of the war in Central Europe. We have been very effective, I think.

Senator **Cohen**. Has there been any compromise in those war gaming operations with the Norwegian spy?

Admiral **Watkins**. To our knowledge, at this point, no, sir. But I have no idea of the depth to which he was involved in the military operations. Obviously we are very concerned about it.

But war gaming is a temporary thing. It is timely for today. What we war game next year may be just a little bit different.

[Deleted.]

ARCTIC ANTISUBMARINE WARFARE

For example, we have run over the past 2 years a number of war games focusing on arctic antisubmarine warfare. [Deleted.]

This we know is their strategy.

How do we know it? [Deleted.]

Now you can say that perhaps it is a cover, a deception technique [deleted].

Again, you have to understand [deleted].

So we are ready to move in a flexible way [deleted].

So we are doing lots of work up there to see the degree to which naval forces can make a difference in the outcome of a conflict in Central Europe, [deleted].

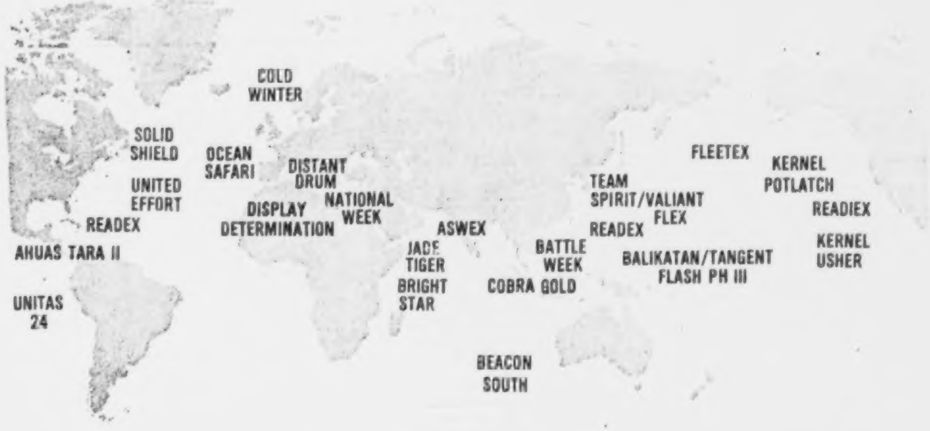
We also can play with penetration aids. These are very important.

[Deleted].

Now we have done that, and that is why we are putting more dollars in electronics of all kinds. [Deleted.]

We can test all those in the war games and it gives us additional confidence that our budget is properly balanced.

U.S. NAVY
MAJOR EXERCISES FY83


COLD WINTER
SOLID SHIELD
OCEAN SAFARI
DISTANT DRUM
UNITED EFFORT
DISPLAY DETERMINATION
NATIONAL WEEK
READEX
AHUAS TARA II
UNITAS 24
ASWEX
JADE TIGER
BRIGHT STAR
BATTLE WEEK
COBRA GOLD
BEACON SOUTH
FLEETEX
TEAM SPIRIT/VALIANT FLEX
READEX
BALIKATAN/TANGENT FLASH PH III
KERNEL POTLATCH
READIEX
KERNEL USHER

What I have here is a series of exercises. You won't be able to read this side over here [indicating], but don't worry about it. I am going to go through about six exercises of the major types that we run, that we have run in the past 15 months, and I will bring you right up to date with the current exercises and talk a little bit about them, because it gets into the areas that Senator Nunn brought up.

In each of the exercises, I have tried to list the main events, the objective of the exercises, and the lessons learned. Then I will talk about how they impact upon our budget decision.

Because this is so far away from your sight, let me talk from my notes.

[Slides deleted.]

This is Northern Wedding 82. There are 160 ships involved, 250 aircraft, 10 nations, a carrier battle group, air force in Norway, and so forth. I will go through the scenario.

The idea was initially, just before Northern Wedding exercise itself, to protect the Reforger resupply lines to Central Europe. We had six merchants going that way, and we defend them up along the Portugese coast, France, and the Benelux ports.

AMPHIBIOUS TASK FORCE

So I am going to talk about the next part of the exercise, which is the amphibious task force landing at Jutland, and how we dealt with rolling back the Soviet air defenses during that exercise.

We optimized the various sensors that we had when we went into this position of the exercise to see if we could defeat our B-52's who were acting as Bear aircraft. As you know, B-52 radar is very much like Big Bulge radar on the Soviet Bear. So we could use them very nicely. We used jammers, including the EA-6B Prowler jammer, the super RBOC, the rapid blooming chaff off the ship, and for the first time we used rapid blooming chaff dropped in cannisters from S-3 aircraft. It worked very effectively.

Now, we saw Soviets as well as our own B-52's. We had 102 Soviet sorties against this force, so we had plenty of exercise activity from the Soviets as well. We know they did not overfly our forces. We escorted them all the time.

Were we giving our tactics away? Well, maybe so. That is a problem we always have, of giving away some of our tactical procedures early. But it is still going to be very hard with their sensors whether they know we are going to use deception or not, and they think we will do it. They have for years. They know we are going to try to deceive them by these kinds of techniques.

The point is that they did not make any approaches on us that we did not intercept outside 200 miles, and they never did find the carrier because of the techniques we used.

[Deleted.]

TECHNOLOGY LEAKS

Senator **Cohen**. Admiral, may I interrupt you for a moment?

In view of the technology leak that we have in this country going to the Soviet Union, is there any reason to believe or not to believe that if we had a wartime situation they would not employ similar techniques against us?

Admiral **Watkins**. They will employ similar techniques. We know, in fact, from our intelligence sources, that they have a setting for wartime and a setting for peacetime in many of their electronic systems, including radar. Their radars will shift to a different frequency, they will shift to different modes of operation, and we are going to have to be ready in our systems to shift with them.

Senator **Cohen**. What about their dropping of chaff or their dropping of acoustic devices?

Admiral **Watkins**. We have watched them with their accoustic devices and chaff all the time. I will talk about one in which they utilized extensive chaff corridors in one of the operations off the Aleutians. We are very familiar with their techniques and we know how to deal with them. In fact, we have counter signal. [Deleted.]

So, there is a constant concern on their part that we are riding close behind them on all of their techniques.

Again, uniquely, the naval forces, due to our operating right next to each other, eyeball to eyeball every day of the year, we can, you might say, give away each other's tactics.

Now, some things we try to protect very carefully, obviously. Some of our electronics we do not use when the Soviets are around. There are some very select jewels in our crown that are protected very carefully.

Senator **Cohen**. Do they not have the same jewels they want to protect from you?

Admiral **Watkins**. Of course, of course. That is why we have to be very wary. We have designed our systems to be flexible recognizing that we are going to have to shift modes, to be able to reprogram the various programmable systems, to be able to counter them. We think we can do that.

In fact, when they have changed modes and we caught them doing this, particularly in submarine surveillance, when they don't know we are there, we can then put that in our system and be ready to shift gears ourselves.

So I believe that we have some very unique sources that keep us pretty well on top of it. Special intelligence tells us that we are really making headway on them in this area.

The important part of this exercise, though, was the defense in depth—with respect to Senator Nunn's comment.

We had Norway, here, cemented. We had the marines there. We had the F-15's at Bodo, Norway. We were then able, with our defenses secured in Iceland, to bring the battle group up here [indicating], and when we brought the battle group up to protect the amphibious task force. Making one of the largest landings we have ever made at Jutland, we began to get this large volume of Soviet air coming down including Badgers and Bear aircraft.

We knew we would get that, so we positioned our forces, in a unique way, because we wanted to test our ability to pass sequentially the target aircraft to the various controllers in our layered defense and get many constructive kills before the Soviet aircraft got down into the area.

We had the *South Carolina* up here [indicating] in [Emcon] emission control for some time, and no Soviets picked it up, and we know that. So it was sitting there.

The Norwegian F-16's were put under the positive control of the *South Carolina* and were then making intercepts on Soviet aircraft out to 167 to 200 miles.

The next tier, then, were the F-15's out of Bodo, which checked in with the NATO AWACS. They were transitioned from the *South Carolina* to the NATO AWACS and brought to intercept the Bears.

Then we had F-4's working with the Air Force AWACS out of Iceland making the next intercept.

Then we had NATO AWACS making intercepts out of the United Kingdom with F-4's, and then our own E-2C organic to the carrier picked it up from the AWACS and intercepted it with the F-14's—all between 250 and 1,000 miles from the carrier.

So, if we can cement these regions, and if we can operate air out of Norway and Iceland and the United Kingdom and our forces here, synergistically we will have a very powerful mechanism to rollback.

Now, obviously, you could say the *South Carolina* is vulnerable out there. We know that. We probably would not position her there without a lot of concern about it. But we wanted to see if she could get up there in a total Emcon against the Soviets and not be detected. She was not detected.

So, it is kind of interesting for us to watch some of the real world events taking place.

These give us a lot of lessons, both strategically and tactically, that we feed back into our data base.

The Norwegians for the first time allowed these F-15's to fly against the Soviets. Heretofore, it had been against their national policy to allow any of their land-based air to go out against the Soviet Union. It was a very important operation.

Senator NUNN. Admiral, if I may ask one question, was there anything that tested the concept in the exercise, as shown on the chart, that we were discussing a while ago, of taking way beyond the *South Carolina* and turning the bend and going up right next to the Soviet homeland? What did you do to test that? To me it sounds like you are talking about two different scenarios altogether.

Admiral WATKINS. Well, we have one underway today. Teamwork 84 lands a Marine brigade at Tromsö, in northern Norway, almost on the border with the Soviet Union. Today the Soviets have [deleted] nuclear submarines surrounding the battle group up there. The battle group is up supporting the marine landing.

[Deleted.]

So, what we are doing is exercising that final phase that perhaps you need to project power ashore with marines somewhere in cold weather. We are not necessarily saying that is in anybody's scenario. But I think it is very important that we run that operation, and it is very important that we find out what the Soviet response is.

Senator NUNN. Again, that is not the same scenario or exactly the same location that you'd have if you were going after the Soviet home ports. I am talking about two different things. I'm not talking about protecting the marines. Anybody who says I am not for protecting the amphibious forces is totally misreading what I am saying. I am talking about carrying the battle to the Soviet homeland and basically using the carrier task force to go after the Soviet home ports.

I have seen nothing in anything of these scenarios to indicate to me that you have tested that at all.

Admiral WATKINS. Well, we don't test it by flying into the Soviet Union, Senator. We test it all of the time, though, just as the Soviets do with us in the Caspian.

Every operation we have run we gear our land mass to perhaps a Soviet site. For example, we may run a Crimean scenario in the Caribbean.

You may not see that, but we simulate running strikes into the Crimea, low level strikes across the Black Sea using AWACS and F-15's and naval forces.

We know how to do that.

Would we do that at the front end of a conflict? Maybe we would. In the Northwest Pacific our feeling is that at the very front end of conflict, if we are swift enough on our feet, we would move rapidly into an attack on Alekseyevka, and we think we could get away with it, because we know what the Soviet real capability is.

They are not 10 feet tall, but there are a lot of them about 5 feet 10. We know where those weaknesses are up in Alekseyevka today. So we might put a carrier strike in there along with the Air Force. We know how to do that. We test that with the Air Force.

We did an exercise that I will talk about later on.

But I would not preclude an opportunity to go in and clobber the Soviets at the right time and the right place. Whether northern Norway access is going to be available is another matter. But we need to be ready to do that, and perhaps not there, but in the Crimea and in the Northwest Pacific. It is a very real opportunity up there for us to make a difference.

[Slide deleted.]

Senator NUNN. But, as I understand it, you are saying that it is very unlikely in this area?

Admiral WATKINS. I think it is unlikely at a very early state, and I just don't think any of our unified commanders at this point see it as anything but a very carefully planned and coordinated rollback operation with heavy SSN to SSN combat in the upper Norwegian Sea. That is where the action is going to be in the early stages. Would the attrition be how well would we do against the surface ships. If we can eliminate the bulk of the surface ships and submarines in the northern fleet, which is our objective then the Soviets will have a heck of a problem with their land-based air as the only real mechanism remaining to deal with us.

TESTING AGAINST BACKFIRES

Senator NUNN. Did you mention the Backfires? Were you testing against Backfires?

Admiral WATKINS. We did in this slide. This was the only time we had Backfires fly out against us. But you will see, probably in a few days, the Soviets using Backfires for the first time against our carrier battle group because of where we were located, which was at the very tip of Norway, right at the top of the northern end of Norway.

They are forward deploying those Backfires today to the cape, and I expect they will fly out for the first time over our forces here in a few days. We are expecting them to come out and we hope they do. We want to intercept all their communications, their radar, and all of the things they do to target us. When we can tell that, then we know how effective we have been, and that might tell us now is the time to strike.

So, I would not rule out anything in the early stages. But I am telling you the normal scenario in the Northern Atlantic-Norwegian Sea is characterized by aggressiveness, and also care, in selecting our timing for moving those forces up into the region. It is very well planned, in my opinion, with SSN's being up there before the conflict starts.

We are working on that today. You may not see it, but in time you will see surge deployments of SSN's worldwide. We are getting into it again.

We just surged out of one port. This month we will surge out of two ports, Hawaii and San Diego. Later on in the year we are going to surge in all ports, and that would be something that we will discuss with the National Command Authority and possibly with the President, to see if we need to alert the Soviet Union that we are doing that, because we have not done it for about 30 years.

So, we know how to surge, and this may be the tool in the President's kit bag 30 days or so, 10 days, before a conflict starts. At least he can do that because that is not provocative. You know, get your SSN's on the way.

Senator NUNN. I agree with you on the SSN's completely.

Admiral WATKINS. They will have a very powerful impact in the northern fleet and up in the sea of Japan, the Sea of Okhotsk, and Bering Sea.

This exercise last year was one of the best exercises that we have run with the Air Force. We had 30 F-15's, AWACS and KC-10 tankers, working together with three battle groups.

The *Enterprise* battle group was returning from WESTPAC. We brought the *Midway* out of Japan. We were deploying *Coral Sea* to the Western Pacific. We rendezvoused up here [indicating] and we tested our ability with the Air Force to coordinate strikes at Petropovlosk or Alekseyevka.

One of the important elements of this exercise was to test our ability to detect and kill the *Victor III*. It was also to test our ability to operate in terrible weather. It was zero degrees up there the whole time, with 50 to 70 knots of wind. We couldn't even fly off the small deck carriers. We could only fly off *Enterprise* at certain times. And, if we hadn't had our Air Force KC-10 tankers on two occasions, we'd have mixed up the wings by having *Midway* and *Coral Sea* aircraft forced to go to *Enterprise* instead of to a divert field.

AWACS were controlling F-14's, surface ships were controlling F-15's, we had total integration, and this was one of our objectives in the Navy-Air Force memorandum of agreement signed by General Gabriel and me. We intend to pursue aggressively this land-based, tactical air and support maritime operation. We are doing that worldwide now in all exercises.

It has extended our ability to project our combat air patrol another 300 miles forward. This is very, very useful in areas where we can be reached by a land-based tanker. Of course, this is a very aggressive operation, and our AWACS aircraft link with Navy units when they can't link at all with Air Force units. The Air Force has not gone into data exchange, and we have. So the AWACS controllers love to work with our F-14's.

LESSONS LEARNED ON NORTHERN WEDDING

Senator **Cohen**. Did you cover the lessons learned in Northern Wedding?

Admiral **Watkins**. The Northern Wedding lessons learned were primarily in a certain area.

Senator **Cohen**. Excuse me, the one question I had was on the Nimrod.

Admiral **Watkins**. Nimrods were very effective in Northern Wedding. The Searchwater radar was the sensor that detected every one of the snorkels from the NATO diesel submarines that were out there. We had six NATO diesels out there, and every one was conclusively killed before the carrier battle group got to the GIUK gap.

So, it was an extremely effective sensor.

Now, we have the new radar that is going into the P-3 being tested today at Pax River. It is very much like the Searchwater. It is compatible with the P-3 system. Its initial operational capability [IOC] will be 86. And we are accelerating that as a result of some of the lessons learned on Searchwater performance, which has been impressive, particularly in the imaging area. It was very effective. Most of the others were mentioned in the discussion in terms of the tactical lessons learned.

The lessons learned here were that we had misjudged the absolute sound and pressure levels of the Soviet *Victor III*. We had made an estimating error, and found that they were quieter than we had thought.

This required all of our forces, and we had six SSN's on our side, to be in direct support of the three carrier battle groups, along with surface towed arrays and land-based maritime patrol aircraft [MPA]. We had LAMPS MK-I helicopters on Canadian oilers. We had a whole range of forces being brought to bear in the antisubmarine warfare area just to work over the *Victor III's* that they sent out after us. We learned that they are very hard to find.

But, what we also learned was that where we had the towed array that covers the low frequency band it was effective every time.

So, we had one sensor that was effective in detecting the *Victor III*. What does this tell us? The lesson learned is if it gets hot, is very successful, then we need to get the low frequency end developed and accelerate its introduction into the fleet.

Now we are working on that. We have put extra dollars into the low frequency end so that we can go after the propellor blade rates and the other things we have to get on a quiet submarine.

So, that was one of the lessons learned out of the operation. Also, many lessons were learned in terms of cold weather operations.

Senator **Cohen**. Do those same lessons apply, say, to the Mediterranean or off the coast of Lebanon? Do you have a difference in water temperature which interferes with that kind of detection?

Admiral **Watkins**. Oh, very significantly. Every place is different.

The [deleted] will, in the process of selling a ship, like the [deleted] class, take a customer out on a sonar run in an excellent area sonarwise. When the customer, say [deleted] buys that ship, and takes it home, they can only get about one-tenth the range that was experienced in the test sonar run. The customers get upset, but actually sonar ranges are quite predictable. The ranges vary all over the map—passive and active. The Mediterranean is extremely noisy, the North Atlantic in some areas where there is heavy traffic is extremely noisy, the marginal ice zone is extremely noisy, and yet, under the ice it is very quiet.

So, we have to go into every single spectrum. We have excellent sensors to give us the information. We are actually building new sensors, called the Navy Oceanographic Surveillance Satellite, to go airborne and help us find those areas of the world, not only to hide in but also to better detect the Soviet submarines. That is another lesson learned.

We are seeing how important real-time data on the environment is. We can't have the information next month, that is, what it was a month ago. We have to know it today, to be able to hide in it and to be able to exploit it in terms of antisubmarine warfare.

All these things we have learned.

[Slide deleted.]

By the way, this is the first time we have been off the Aleutians since World War II. It is very important that we get back up there. It is part of the new, and rejuvenated, Pacific Basin strategy of the Unified Commander. Let's get back into the Aleutians and demonstrate to the Soviet Union that they don't have a free ride and divert their attention away from Japan which has been so intense of late. They are going to worry a lot more about looking east instead of south to Japan. We can make a difference. Kamchatka is a difficult peninsula. They have no railroads to it. They have to resupply it by air. It is a very important spot for them, and they are as naked as a jaybird there, and they know it.

[Deleted.]

[Slide deleted.]

United Effort was a major transit exercise across the ocean. Again, we were trying to defeat the Soviet ocean surveillance system.

This is a bone of contention between Jim Gracey of the Coast Guard and myself. He keeps thinking that he is going to get blown out of the water because he is a simulated carrier, but he has agreed that that is a good role for them to play. [General laughter.]

The integrated intelligence analysis system was put in the United Kingdom. This is the Fleet Ocean Surveillance Information Center which receives real time downlink information from our satellites. That proved to be extremely successful and gave us some clues as to how we could accelerate the intelligence input into our carrier battle group.

We had cover and deception throughout the exercise, and not once did we allow any of the Soviet or our own orange aircraft to get in on us undetected. They were not able to target us because of the same systems that we used.

We used the 4 Whiskey formation nominally 56,000 square miles inside that one battle group, nominally, in that are. I will talk a little bit more about that later because it is a very important concept.

[Deleted.]

[Slide deleted.]

READEX 2-83 was a very special exercise in which we prepared *Independence* and *JFK* carrier battle groups for operation in the eastern Mediterranean.

Because things were heating up over there, our scenario then was built around the concept of using the Puerto Rican island of Vieques and the Dominican Republic here—this is really west—for running a scenario involving Damascus and Lebanon. Crises building up there could degenerate into conflict with the Soviet Union.

We do this rather religiously. We pick out where Tel Aviv, Haifa, Damascus, where those sites are, Nicosia and so forth are, and we run operations, escalating the scenario with more and more conflict as time goes on in order to better prepare our ships.

This is a very important exercise because many of the features that were in this plan that we exercised on in the Caribbean were actually seen by both of the battle groups when they actually had to put in aircraft over the beach.

We know all of the electronic warfare order of battle. We know the forces. We know where the radars are. We know what the threats are, and so we were able to do our strike work, do our planning, and so forth, in a very realistic way in this sort of picture.

That is how we run our exercises. I pointed out that it was rather unique.

In addition, in this particular one, we fired Harpoons, seven Harpoons, seven hits against a hull. For the first time, we had an integrated strike of Shrike, Harpoon, and Standard ARM that all hit the target at the same time, which is in the scenario of our standard operating procedure for running coordinated strikes against ships.

Now the next slide, and we are closing it out here, is the real world.

[Slide deleted.]

REAL WORLD SITUATIONS

The real world situation is also every bit as important for us as exercises. The real world would include Grenada, Lebanon, the Strait of Hormuz, and the Falkland Islands. From the Falkland Islands experience we accelerated our electronic warfare assistance because we saw how easy it was to use some of the low cost systems to ensure that our fleet was not put at risk. As a result of the Falklands conflict we accelerated our mine countermeasures ship program. We have to ensure that we have the capability to move quickly into the region with adequate airborne and surface mine countermeasures systems.

The point defense system was probably the biggest lesson learned. We put $167 million into accelerating delivery to the fleet of our close-in weapons support system. This, by the way, was almost $500 million [indicating] of refocused resources to move into a whole variety of electronic warfare systems.

In Lebanon we have just purchased decoys and remotely piloted vehicles (RPV's) from the Israelis. We are not as proficient today as we were in Vietnam. We have to get back into the business, and perhaps we can avoid employing our TARPS aircraft in Third

World regions where the RPV can go in and survey, and send back signals as to what to bomb, what the damage assessment might be, for example.

On the tactical reconnaissance pod, we learned how to use our TARP missions very effectively over there, and we will be making certain recommendations and changes in our program to optimize our ability to do standoff reconnaissance. For example, optical standoff reconnaissance equipment is now being accelerated in research and development.

Ship/shore intelligence fusion: we found that we could provide the marines with a lot more offshore sensor information by taking information from a warship and patching it into the short-range intelligence network. We are doing that more and more now. In fact, we were doing that with the current intelligence that came out of Lebanon.

In the future, we will be able to fuse to the marines condensed information so they don't have to sift through the volume of data that is more chaff than wheat.

We learned a most important lesson about rules of engagement in Lebanon, and that was, get aggressive with your rules of engagement so you don't take the first hit from "crazies."

We are doing that now there and in the Persian Gulf. I think that is a major step forward for the President to allow us to do that, so that we give the commander on the ground some feeling that he does not have to take a kamikaze attack before he brings down that kamikaze.

That is a very delicate balance, so that we don't end up with a KAL-007-type problem on our hands.

Senator COHEN. Or a Czechoslovakian airlines.

Admiral WATKINS. Exactly.

But the way that is handled, of course, is that we announce through demarches to the nation that is making the threat, and to the world that in this region, around American ships, we have these rules, and to stand clear, to come up on guard frequency, talk to us, don't come charging at us from 2,000 feet and 5 miles away and expect not to get a bunch of tracers shot across your bow. And if you come much closer than that, you are going to be brought down.

That is the game we are playing in the gulf and eastern Mediterranean. We will raise those rules elsewhere in the world as necessary to respond to irresponsible nations who are using this as their mechanism to get the United States.

In Grenada, we have a working group convened now to compile all of the lessons learned. One of the quick lessons learned was to give our SEALS $5 million. We had no idea that their equipment was not completely up to snuff. The system does not protect the SEALS well enough.

We have completely revamped our organization structure and brought decisions concerning the SEALS up to my level. All they needed was $5 million to put them in 4-O shape. They had engines that had broken down during their operations and that sort of thing, which was really devastating to the operation. We can fix that quickly. That was a lesson learned. This means that we can get photographs from overhead, transmit them to the shore system, back to the carrier, and they can actually use them for targeting. It is a very, very effective system. We will be able to use that information for targeting today. It is very important in a strike mission and is a very effective system, so we are accelerating its development.

[Slide deleted.]

NAVAL STRATEGY

The last slide is a summary of our naval strategy, the end result being war termination without use of nuclear weapons. A large portion of that derives from our maritime strategy which says there is an opportunity to provide the President with a nonnuclear option to put at risk their nuclear force. Whether you use it, under what circumstances, how you play that game, all is another matter. But we are very conscious of the fact that we can make a difference in the outcome of war without the use of nuclear weapons.

We understand their weaknesses. We know what they are, and we go for them. We go for the jugular on those weaknesses.

It is an aggressive operation vice defensive. We talk about defensive, but that is the national posture. Our feeling is that an aggressive defense, if you will, characterized by forward movement, early deployment of forces, aggressiveness on the part of our ships, is the greatest deterrent that we can have. And the Soviets really understand that. We can get their attention with that concept.

The forward areas on all three flanks of the homeland are extremely important. They are every bit as important to the Soviet Union as Central Europe. That is extremely important to know. They are going to continue to put one-third of their entire military in Northeast Asia, where they have them today—and this is a very fine military force. The best and the largest of their fleets are in the Northeast Asian area and Northwest Pacific.

Our operations are going to be sequential. We are going to perform traditional naval missions in addition to the global war strategy. This takes in all levels of conflict we see in the world today, and we have to have the capability to deal with those.

But we have some shortfalls in our strategy, and those are covered in the next slide.

[Slide deleted.]

This is critical to us and it is paying off more every day, what the Congress has done to help us get our feet back on the ground. We need the new design SSN to be able to continue to outdo the Soviets who, as I said, have 15 SSN's and SSGN's surrounding the battlegroup today as we conduct the amphibious landing up in northern Norway, We know how to get inside there and find them, trail them, and kill them. But we cannot keep doing that forever without getting into the next generation of SSN. The new design surface combatant, the DDG-51 with vertical launched Tomahawk, will be able to strike ashore and improve our power at sea. It provides a tremendous capability in anti-air warfare and suitable capability in other areas to support the forces that she will be serving with; underway replenishment groups, surface action groups, and amphibious support as well as carrier battlegroup support.

We have upgraded our medium attack aircraft, the A-6E/F. It is very important to get into the modern age, to get the commonality, to get the digital systems such as we have on the F-18 transition over here.

[Deleted.]

The towed arrays, an SQR-19's, are extremely important. I talked about those. I would accelerate the low frequency end of that array, which is critical as the Soviets get quieter.

STANDOFF WEAPONS

Everything we see drives us toward more standoff weaponry. We can have survivable aircraft if we can standoff, but we don't have to have excessive range to standoff. We know how to work the tactics, providing we don't have to go right in overhead a la World War II.

The Air Force and allied AAW support is extremely important. We have an aggressive program worldwide, and we are going to be great supporters of AWACS, land-based tankers, and our interface with the F-15 and F-16 in a land battle. We are going to be in the same area, the littoral nations, and we are working very closely with them to insure that we have the best possible operational interface.

And we have C^3 interoperability with not only our sister services, but all allies, but it is not good enough yet. We need to improve that. We have a lot of resources devoted to that.

I personally am trying to help our allies and encourage them to improve their C^3 interoperability. That is critical. I have just sent some equipment to Japan to help do that.

Senator **Cohen**. Admiral, thank you very much for that overview, and Secretary Lehman, thank you very much.

I will take about a 10-minute break. Otherwise I will have a shortfall on constituent support back home. I have some people who have been waiting outside for me for half an hour. I will take about 10 minutes. Then I would like to go into another level of classification, to perhaps address a couple of questions to Secretary Lehman and Admiral Watkins.

We will stand in recess for about 10 minutes.

[A brief recess was taken.]

[An off-the-record compartmentalized briefing followed:]

Senator **Cohen**. Gentlemen, thank you all very much for your appearance here today and for your briefing.

[Subsequent to the hearing, the following questions were submitted to the witnesses to be answered for the hearing record:]

QUESTIONS SUBMITTED BY SENATOR DAN QUAYLE, ANSWERS SUPPLIED BY ADM. JAMES D. WATKINS

E-2C

Senator **Quayle**. As I understand it, one of the top priorities of our naval strategy is to protect the U.S. fleet from Soviet Backfire bombers and cruise missiles. Are you comfortable with the Navy's current capabilities for surveillance and early warning to the fleet?

Admiral **Watkins**. Soviet Backfire bombers and cruise missiles constitute a threat which our forces must be able to counter successfully in order to carry out assigned missions. Current surveillance systems support fleet long range early warning requirements to counter Badger and Backfire bombers and cruise missiles. There are various wide area surveillance and warning sensors available to the fleet, including national sensors and USAF and NATO land assets. When combined with organic battle group assets, they provide sufficient depth in wide area surveillance and warning to the fleet.

Senator **Quayle**. How does the E-2C aircraft fit into your mission of early warning against cruise missiles and hostile aircraft?

Admiral **Watkins**. We use the E-2C to provide long range detections and electronic signals intercept of both air and surface launch platforms and anti-ship cruise missiles beyond the battle group's surface radar horizon. The E-2C's early warning capabilities are used with other horizon extension systems such as the EA-3B, the EP-3, land based USAF and NATO E-3A AWACS aircraft and the surface picket units, to provide an integrated and well balanced fleet early warning system.

We also use the E-2C to vector fighter interceptors and coordinate employment of countermeasures against hostile aircraft at the extreme reaches of the outer air battle and direct strikes against surface cruise missile capable ships before they are able to launch their missiles. Once anti-ship cruise missiles are launched from either air or surface platforms, the E-2C can detect and track threats beyond the surface radar horizon and provide track information to other units which would concentrate surface to air missiles against the threat.

Senator **Quayle**. I understand that the E-2C is the Navy's only carrier-based early warning aircraft in the inventory. Do you have plans to expand the existing fleet of E-2C's and expand their use as our fleet becomes more and more vulnerable to Soviet cruise missiles?

Admiral **Watkins**. First, I would take issue with the statement that "our fleet becomes more and more vulnerable to Soviet cruise missiles". As I indicated above, we are continuing to improve our wide area surveillance systems in order to detect cruise missile launch platforms at longer ranges. We have a series of improvements across the spectrum of detection, targeting, destruction, and deception which allows us to keep pace with or exceed the pace of Soviet cruise missile developments. Regarding the E-2C, we plan to procure sufficient E-2C aircraft to achieve an all E-2C force by 1988. We have 74 E-2C's now and need a force level of 100 to equip fourteen fleet squadrons, two training squadrons, and two reserve squadrons. We have completed an Air Wing Composition Study and are considering expansion of the existing four plane E-2C squadron to five planes to provide the air wing with greater surveillance and multiple mission assignment capability. We expect to address this plan in the FY 1986 budget.

E-2C EARLY WARNING INVENTORY

Senator **Quayle**. I understand that the E-2C is the Navy's only carrier-based early warning aircraft in the inventory. Do you have plans to expand the existing fleet of E-2C's and expand their use as our fleet becomes more vulnerable to Soviet missiles?

Admiral **Watkins**. The Navy's stated objective is to procure [deleted] E-2C aircraft and to achieve an all E-2C force by 1988. This will provide E-2C's for 14 fleet squadrons, 2 training squadrons, and the Navy's two reserve E-2 squadrons. The Navy has recently completed an Air Wing Composition Study which recommends the present 4 plane E-2C squadron expand to 5 planes. The fifth E-2C provides [deleted]. The procurement implications of this study will be addressed in the fiscal year 1986 budget. While the E-2C is the Navy's only Early Warning Aircraft, planned improvements to its weapon system and engine will ensure that it remains capable of countering the projected threat through the 1990's.

U.S. NAVAL STRATEGY

Senator **Quayle**. How satisfied are you today with the Navy's ability to support U.S. forces in keeping open the Strait of Hormuz? Do you see any major limitations on the U.S. being able to respond effectively?

Admiral **Watkins**. [Deleted.]

SOVIET NAVAL THREAT

Senator **Quayle**. What would you characterize as the two or three most significant developments in the Soviet navy over the last decade? What new threats out into the future pose the most serious threats to our fleet?

Admiral **Watkins**. The three most significant developments of the past decade are:

Long-range, submarine launched ballistic missiles armed with MIRV's aboard DELTA and TYPHOON Class SSBN's.

[Deleted] submarines—*Typhoon, Oscar, Mike* and *Sierra*—which are [deleted] and [deleted] than their predecessors.

Improvements in fleet air defense, including the deployment of long range, area AAW missile systems and Forger VTOL aircraft aboard *Kiev* Class carriers.

In the future, we anticipate the most serious new threats will be in the area of:

Undersea Warfare. Soviet efforts to quiet their submarines will continue and could result in erosion of our acoustic advantage. Additionally, Soviet ASW improvements in platforms, sensors and tactics could further diminish our advantage.

The use of space for surveillance and command and control. Improved systems and better networking will provide real-time locating and targeting data to major naval forces and provide Moscow the means to coordinate closely the employment of their forces.

Sea-based air power. The Soviets are building their first conventional take-off and landing aircraft carrier. It will embark modern, high performance aircraft, capable of carrying out offensive and defensive missions much more effectively than the current Forger VTOL.

ALPHA CLASS SUBMARINE THREAT

Senator QUAYLE. Much has been made of the new Soviet *Alpha*-class sub and its titanium hull. I know Jack Anderson has written that the sub is "one of the noisiest vessels ever to churn the ocean". Still, I am told the sub may be able to dive deeper and run faster than some of our subs. Can you give us your assessment of the threat posed by the *Alpha*-class ship and what we are doing to counter it?

Admiral WATKINS. The Soviet *Alpha* Class submarine enjoys speed and depth advantages over our SSN's, but these advantages are offset by the high acoustic noise level it generates and the inefficiency of its sensors at high speed. It is a fast, deep diving, special purpose submarine that does not have sufficient warfighting capability for a long duration engagement. Although we possess the technology to build submarines capable of very high speeds, we have emphasized the tactical advantage of stealth and devoted considerable technical efforts to quieting. Our modern SSN 688 is designed for covertness, endurance, mobility and reliability and is tactically superior to the *Alpha*. Our Improved SSN 688 Class builds on this superiority and will maintain it through the 1990's with improvements in quieting and warfighting capabilities designed to counter Soviet advances in quieting, sensors and weapons. These Soviet advances are more disturbing than the *Alpha's* speed and depth advantages and dictate the development of our new Design SSN to maintain our superiority in the decade beginning 1995.

QUESTIONS SUBMITTED BY SENATOR SAM NUNN, ANSWERS SUPPLIED BY HON. JOHN LEHMAN, SECRETARY OF THE NAVY; AND ADM. JAMES D. WATKINS, CHIEF OF NAVAL OPERATIONS

CARRIER AIRCRAFT STUDY

Senator NUNN. Do you expect to operate multiple-carrier battle groups in which the carriers would have different aircraft loadings? What is the underlying philosophy, and how far can such specialization be carried?

Secretary LEHMAN. We already operate multi-carrier battle groups in which carrier air wings (CVW's) with different compositions are embarked. USS CORAL SEA and USS MIDWAY carry F-4's since they can't accomodate F-14 aircraft. We sometimes structure CVW's for specific missions and threat scenarios and some CVW's transition as a new type of aircraft is introduced. We need to continually refine the composition and employment of CVBG's and CVW's for the different missions and threat scenarios we may face. Specialized CVW's have advantages and we are learning effectiveness and cost implications by deploying them. We're not sure exactly how far specialization can be taken and still increase effectiveness. We will continue to employ different aircraft mixes to see whether certain changes would enhance our capabilities.

GRENADA—LESSONS LEARNED

Senator NUNN. The Navy did an excellent job in studying the experiences of the United Kingdom in the Falklands and preparing an extensive document and presentation on the "Lessons of the Falklands." I am just wondering if the Navy is preparing any similar document on the "Lessons of Grenada" which our forces were directly involved in. In particular, I am interested in how the various service components worked together and the relationship of the JCS to the planning done at CINCLANT, a major naval command. I am also interested in the intelligence aspects. Is the Navy doing any formal analysis of Grenada and when can the committee expect any formal written "lessons learned?"

Secretary **Lehman**. We are analyzing Operation Urgent Fury to develop Lessons Learned which may be useful in improving the capabilities of the Navy and Marine Corps. We intend to publish a formal, classified report in early summer of this year and will forward a copy of the Navy report for your review.

CARRIER AIRCRAFT STUDY

Senator **Nunn**. The Navy is experimenting with several new aircraft mixes on various carriers. Would you supply for the record the following information.

What are the objectives or hypotheses being tested in each variant?

What information or data will be evaluated?

When will the evaluation be completed?

Secretary **Lehman**. We are attempting to determine which carrier air wing (CVW) mix of aircraft will provide the optimum flexibility and capability for different missions and threat scenarios. We are gathering operational data, including mission effectiveness in each of the primary warfare areas, as well as maintenance and availability rates. For instance, we are examining the effectiveness of a CVW with just medium attack aircraft (A-6) for strike missions. Other CVW's will test various mixes of strike fighters (F/A-18) and air superiority fighters (F-14). This process is part of a continuing evolution to have the most capable force at sea to meet ever-changing commitments and threats, while at the same time finding the lowest cost ways to deploy an effective air wing.

SUBMARINE PROGRAM

Senator **Nunn**. In terms of reaching the Navy goal of 100 attack submarines, what difference does it make as to whether three or four 688's are funded in fiscal year 1985 and in the next few years ahead.

Admiral **Watkins**. We cannot achieve and maintain a force level of 100 first line nuclear attack submarines if only three SSNs per year are authorized. At least 100 SSNs are needed to give us reasonable assurance that we could prevail in conflict with the Soviets.

I would also like to point out that the Improved 688s requested in fiscal year 1985 are far more capable than our earlier SSNs. Since we would rely on our qualitative advantage in any conflict with the Soviets, it is crucial that our SSN force include as many of these highly capable ships as possible.

Senator **Nunn**. Will the 688's now being requested be capable of meeting the Soviet threat and could you briefly describe any planned component improvements?

Admiral **Watkins**. Yes sir. The improved SSN 688s will have a clear advantage over any submarine or surface threat introduced by the Soviets in the next ten years and should be highly effective against the Soviets for the rest of the century.

The improved SSN 688 will be far more effective in mission performance than older SSN 688s because of quieting modifications and increases in sensor and weapons capabilities. Major improvements include:

[Deleted.]

Vertical launch system [deleted].

Arctic modifications [deleted].

Mining modifications [deleted].

Sensor and combat system upgrades including an advanced sonar and combat system (SUBACS).

Senator **Nunn**. Will all four of the submarines in this budget be the improved version of the 688?

Admiral **Watkins**. Yes sir.

Senator **Nunn**. Discuss some of the older classes of U.S. attack submarines which will be only marginally capable of meeting the threat of the 1990's.

Admiral **Watkins**. In the year 1990, we will still have in service over 50 attack submarines built prior to the introduction of the *Los Angeles* class. While these ships will be fully capable of opposing the 1960's and early 1970's vintage Soviet submarines, they will be only marginally capable of opposing Soviet attack submarines introduced since the mid-70's.

In the last ten years the Soviets have developed twelve new classes of submarines. Between the introductions of the *Los Angeles* Class in 1976 and our New Design

Attack Submarine in 1995, the Soviets will put fourteen new classes of attack submarines to sea. Each of there classes will incorporate new capabilities thus making our older ships less capable of opposing the Soviet fleet. Quite clearly, the rate at which the Soviet attack submarine force is being modernized is unprecedented and represents a growing threat to our maritime superiority.

For this reason, the Improved 688 is vital to our interests. Each Improved 688 will give us a significantly improved capability for dealing with the Soviet submarine force of today and that projected for the immediate future. As our older ships lose their advantage against the more modern Soviet submarines, it is essential that we introduce new submarines with the warfighting capability to prevail.

Senator NUNN. Is the issue of procurement of four submarines in fiscal year 1985 related to the new submarine for which there are R&D funds in this budget? What is the linkage if any, between the new submarine and the question of whether there should be three or four 688 attack submarines in the fiscal year 1985 budget?

Admiral WATKINS. The number of SSN 688s authorized in fiscal year 1985 is not linked to the R&D work. We must build up our SSN force level now with Improved SSN 688s, but still be looking to the future when a new SSN design is needed.

Senator NUNN. The stated Navy Policy is to maintain two shipyards for producing attack submarines. In terms of the attack submarine industrial base, if this program is to be maintained at three per year, what is your assessment as to the effect on the industrial base if there is an average of only 1.5 submarines per yard per year?

Admiral WATKINS. Maintaining an industrial base for attack submarine construction requires a workload that will adequately maintain an acceptable experience level of all shipbuilding personnel, transfer that experience to new personnel through training and adequately utilize shipbuilding equipment and facilities. In terms of shipbuilding experience and training, the industrial base for submarine construction in the two shipyards would be maintained with the authorization of only 1.5 submarines per yard per year, however, both shipyards would be operating well below capacity, thereby increasing the unit cost of building submarines.

Shipbuilding capacity in both shipyards is, in fact, underutilized and has been for the last several years. Nevertheless, each shipyard is improving its facilities for submarine construction to implement modern shipbuilding techniques and to enhance producibility. Electric Boat Division has, over the past several years, significantly upgraded its production equipment and methods resulting in an increase in capacity and improved productivity. Newport News Shipbuilding plans to implement similar improvements in its shipbuilding capabilities in the near future. As each shipyard modernizes its industrial plant, the imbalance between shipbuilding capacity and utilization of that capacity will grow leading to manning reductions. The industrial base will be maintained, but without full realization of the producibility and productivity improvements.

Senator NUNN. In addition to the shipyard, is there a requirement for a specialized base for supply of naval nuclear power equipment? In terms of the naval nuclear power industrial base, what is your assessment of the impact of limiting 688 construction to three rather than four per year?

Admiral WATKINS. There is a requirement for a specialized base for supply of naval nuclear propulsion equipment as well as for shipyard industrial facilities. This nuclear industrial base is currently underutilized and would remain so with a three per year building program. At the projected shipbuilding of our SSNs and one SSNB per year there is only enough business to sustain two suppliers of major items of heavy equipment with the two suppliers operating in the neighborhood of 50 percent capacity. With a limited base such as this it is difficult to maintain competition between the two suppliers. Reducing the proposed program to 3 SSNs per year would exacerbate the present condition of underutilized capacity leading to less efficient production and higher unit costs.

Senator NUNN. What connection do you draw between the submarine construction rates funded in the budgets of the last seven years and this request for four SSNs in fiscal year 1985?

Admiral WATKINS. For the past seven years, the attack submarine authorization rate has been only 1.9 per year which is far too low to reach the goal of 100 attack submarines by 1990. Indeed this building rate would not even sustain a force level of 60 SSNs. In order to meet the force level goal by 1990, four SSN-688 Class submarines must be authorized in fiscal year 1985. Any number less than four SSNs in fiscal year 1985 would delay achieving the 100 SSN force level.

In 1978 and 1979 only one SSN was authorized each year. The authorizations increased to two per year for the next four years and last year the Congress authorized three SSN-688's for construction. This upward trend must be continued into fiscal year 1985 if we are to achieve our goals.

Another very important consideration is that the submarines to be authorized in fiscal year 1985 will be signficantly improved over earlier ships of the class. Major quieting and mining modifications, incorporation of the Advanced Combat System (SUBACS), enhancement of arctic warfare capabilities and incorporation of the Vertical Launch System markedly improved the warfighting capabilities of the class. It is very important that we acclerate fleet introduction of SSN-688s with the improvements if we are to satisfactorily counter the threat of the 1990s.

Senator NUNN. Will the Navy be able to sustain a four per year attack submarine production if the real growth in the Navy budget for the FDYP is less than planned, say on the order of 3-5 percent average real growth?

Admiral WATKINS. Both Secretary Lehman and I are committed to a four SSN per year building program even at lower rates of real growth in the navy budget.

Senator NUNN. Last October in the Appropriations cycle, Senator Cohen and I worked to include long-lead funds to preserve the options for four submarines in the fiscal year 1985 program which you have now requested.

How important is the number four, and is there any link between the need for three or four submarines in the fiscal year 1985 budget and the new design attack submarine?

Admiral WATKINS. The number four is very important. We must build four SSNs per year to achieve our SSN force level objective of 100, which is the minimum number needed to carry out our missions.

The Soviet Union currently outnumbers the United States in attack submarines by a ratio of 3 to 1 and will maintain that ratio by building three times as many submarines as we do. Moreover, the Soviets are introducing new classes of submarines at a rate nearly seven times greater than the United States. In short, the Soviets are rapidly modernizing their submarine force by building a large number of new and more capable ships.

To maintain undersea superiority, we must keep our qualitative edge. Our Improved 688 Class submarines, such as the four in the fiscal year 1985 budget, must be introduced to the fleet as rapidly as possible—and in numbers—to redress the shrinking margin of supremacy for our attack submarine force.

There is a limit, of course, to the improvements we can incorporate into the 688 Class. A New Design SSN must be developed. The New Design SSN is the next step in the process of modernizing our force at a rate adquate to maintain our margin of undersea superiority and address the projected threat from the Soviet fleet in the 1995 time frame.

CARRIER BATTLE GROUP ESCORTS

Senator NUNN. When carriers operate in multiple formations, do the battle groups require the same ratio of escorts as when operating independently?

Admiral WATKINS. The force structure of individual CVBG's is not affected by employing them in a multiple CVBG force. Although dictated by the tactical situation, the special disposition of multiple CVBG forces is generally such that there is a physical expansion of coverage requirements, rather than an overlap. Thus mulitple CVBG's require the same ratio of accompanying surface combatants and submarines as single CVBG's to meet the demands of expanded battle space. The improved capability which we achieve is a function of the aggregate of all the multiple CVBG forces.

NAVY BUDGETS

Senator NUNN. As these budgets are inevitably adjusted downwards, what priority do you place on the submarine portion and anti-submarine warfare part of the Navy budget?

Admiral WATKINS. All of our forces are mutually supportive and our budget submission reflects a balanced approach to meeting all our requirements. Any downward adjustments must also reflect this balance or run the risk of detroying the mutually supportive nature of our force. For this reason, it is very difficult to set priorities among the surface, sub-surface, and airborne components of our defense requirements. Our strategic submarines are a vital part of this nation's deterrence strategy. Our tactical submarines and our Anti-Submarine Warfare forces contribute to the total war fighting capability of our fleet and are essential to our ability to keep open sea lines of communication in time of war.

Senator NUNN. What percentage real growth will it require in the Navy budgets this year and for the next 4 fiscal years to execute the Navy's program?

Admiral **Watkins**. We need the real program growth of 12.7 percent contained in the fiscal year 1985 budget for the Department of the Navy. Assuming approval of the fiscal year 1985 budget as requested, the projected real program growth amounts for the DOD (9.2 percent in fiscal 1986, 3.5 percent in fiscal year 1987, 3.8 percent in fiscal year 1988, and 3.9 percent in fiscal year 1989) will enable the Secretary of Defense to allocate to the Department of the Navy sufficient resources to meet our 5 year plans and achieve the required force levels.

CARRIER BATTLE GROUPS (CVBG)

Senator **Nunn**. If carriers are primarily going to fight in groups in wartime, does this mean 15 carriers no longer equal a 15-carrier battle group Navy?

Admiral **Watkins**. Combining CVBG's is a matter of tactical employment instead of force composition. Fifteen Carrier Battle Groups (CVBG) are the minimum required to accomplish our warfighting maritime strategy and maintain our flexibility in peacetime. Combining groups is sometimes prudent in a high threat environment to reduce risk and increase the probability of success while projecting power ashore and providing mutual self defense.

Senator **Nunn**. Recently, we see two CVBG's operating together such as off Lebanon. You talk in your briefings about multiple carriers operating together. Are the force objectives changing?

Admiral **Watkins**. Our force objective of fifteen deployable carrier battle groups (CVBG) has not changed, but we are continually refining the employment strategy and tactical use of CVBG's. Based on joint exercises and operational experience in the Indian Ocean, Eastern Mediterranean, and Western Pacific, we have found that two CVBG's operating together complement each other's capabilities and their combined capability is much greater than two CVBG's operating singly. To increase our chances of success and reduce risk in establishing control of the sea in those areas where U.S. interests are vital, we have combined CVBG's into a carrier battle force.

Senator **Nunn**. Have you changed the definition of what constitutes a carrier battle group? I recall that it used to mean one carrier and its escorts.

Admiral **Watkins**. No, a carrier battle group (CVBG) is comprised of the carrier and the surface warships and submarines required for its direct support and is tailored to a given threat and mission scenario. The classes of ships and the mix will also change as our force composition changes and more capable ships such as CG-47 and DDG 51 take the place of our aging DDG-2/DDG-37 Class ships. Multiple CVBG's will retain all of the support ships that each had individually.

SOVIET FORCES IN FAR EAST

Senator **Nunn**. What capabilities would be needed to suggest to the Soviets, primarily through deterrence, that their forces in the Far East might be "isolated" in the context of a NATO scenario?

Admiral **Watkins**. Powerful strike forces in the Far East (e.g. aircraft-carriers, cruise missile platforms, and attack submarines) force the Soviets to commit and maintain forces there. The Soviets measure the threat we present and attempt to counter it, reducing the forces they can commit to an attack against NATO and thereby helping to deter such action. Our forward deployed forces also assure our allies—Korea and Japan—of our support and could ensure that other regional powers, (primarily the Peoples Republic of China) maintain a posture that is at least neutral.

Senator **Nunn**. What capability does the Navy have, or planned, to contribute to a mission—if required—to tie down Soviet forces in the Far East?

Admiral **Watkins**. Our Carrier Battle Groups (CVBG) give us the mobility and capability we need to exert pressure from the sea on the geographic area of the Soviet Union most vulnerable to attack. The Soviets would likely respond with their Pacific Fleet Naval Forces and their land and air forces. This pressure would deny the Soviets a [deleted]. We need strong, offensive forces in the form of CVBG's, cruise missile platforms, and attack submarines as well as the support of our sister services and allies to accomplish this.

Senator **Cohen**. The subcommittee is now adjourned.

[Whereupon, at 5:08 p.m., the subcommittee adjourned, to reconvene upon the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

WEDNESDAY, MARCH 28, 1984

U.S. SENATE,
SUBCOMMITTEE ON SEA POWER AND FORCE PROJECTION,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

FORCE PROJECTION PROGRAMS

The subcommittee met in open session pursuant to notice, at 10:11 a.m., in room SR-222, Russell Senate Office Building, Senator William S. Cohen (chairman), presiding.

Present: Senators Cohen, Wilson, and Nunn.

Staff present: L. Wayne Arny III, Robert F. Bayer, James R. Locher III, David S. Lyles, José E. Martinez, Mark B. Robinson, professional staff members; Patricia L. Watson, research assistant; Barbara B. Brown and Kathleen L. McGuire, staff assistants.

Also present: James H. Dykstra, assistant to Senator Cohen, Bernard R. Toon, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; James Steinberg, assistant to Senator Kennedy.

OPENING STATEMENT BY SENATOR WILLIAM S. COHEN, CHAIRMAN

Senator COHEN. Today's hearing is going to forcus on force projection programs, and I think it is symbolic that we have witnesses from all four services before the subcommittee today because in the force projection area interservice cooperation is critically important.

Unfortunately, the necessary degree of cooperation in funding support has not been evident in the past. Congress has made a significant commitment in recent years to revitalize U.S. force projection capabilities and between the fiscal years of 1982 and 1984 funding for these programs has been increased by 130 percent. Nearly every force projection program before the subcommittee this year for authortization is a mature one, initiated or substantially expanded over the past 3 years.

As a consequence, the subcommittee will have considerable difficulty in developing funding reductions which are likely to be necessitated by budget constraints. Hopefully today's hearing is going to help the subcommittee to establish appropriate priorities.

On behalf of the subcommittee I want to extend a warm welcome to the five distinguished witnesses for today's hearing—Gen.

Thomas Ryan, Commander-in-Chief of the Military Airlift Command; Vice Adm. Robert Walters, Deputy Chief of Naval Operations for Surface Warfare; Rear Adm. Richard Avrit, Director of Strategic Sealift; Maj. Gen. Harold Glasgow, the Director of the Operations Division of the U.S. Marine Corps; and Lt. Gen. Fred Mahaffey, Deputy Chief of Staff for Operations and Plans, U.S. Army.

The entire written statements of the witnesses will be placed in the record. During your brief opening remarks I would ask you to focus on the most critical programs and issues in your respective areas.

General Ryan, I think it would be most useful if you made your opening statement first, and then I will ask the Navy and Marine Corps witnesses to follow you. General Mahaffey will then have an opportunity to discuss the Army's perspective on the force projection programs.

Though Senator Hart seems preoccupied with other priorities right now, I am hoping that Senator Nunn, when he arrives, will offer any comments that he might have. But, General Ryan, why don't we begin with you?

STATEMENT OF GEN. THOMAS M. RYAN, JR., COMMANDER IN CHIEF, MILITARY AIRLIFT COMMAND

General RYAN. Thank you very much, Mr. Chairman. I appreciate the opportunity to testify before this subcommittee. I do have a statement for the record to submit. I will confine my brief opening remarks, as you suggested, to my primary mission area, that of airlift.

As you know, as Commander-in-Chief of MAC I am responsible for moving the forces that these gentlemen on either side of me put together and train, move them rapidly whenever and wherever they may be required. In the interest of satisfying that airlift requirement we have leaned very heavily on the strong support of this committee and the Congress in the areas that you outlined in your statement, and we very much appreciate that support.

Looking at our future airlift force structure, which is the subject at hand, we look to the acquisition of 50 C-5B aircraft with first delivery next year as the beginning of that force build, the last aircraft to be delivered in 1989.

Of course, we have the CRAF enhancement well in hand, five aircraft signed up right now, and the KC-10 program is moving along right now toward a total buy of 60. That is followed in the 1990-98 period by the C-17. That force, those four aircraft, are very much complementary.

They address initially the long-haul problem of inter-theater airlift, and, very importantly in the case of the C-17, they address direct delivery of those forces to where the combatant commanders need them in the theater, thereby relieving congestion at the ports, the major aerial ports as well as the seaports, and downloading the POMCUS sites where the Army division sets are prepositioned in Europe, and likewise where a considerable amount of equipment is prepositioned in southwest Asia.

The C-17, I think, is uniquely suited to this role. It is a very survivable aircraft designed to survive in a semi-hostile environment.

It promises to be a highly reliable aircraft and that reliability, backed up by very strong warranties—unprecedented in terms of new aircraft acquisition—warranties that the contractor stands behind at his own expense to correct any deficiencies that keep the aircraft from meeting the performance standards that are laid out in the contract.

Senator COHEN. Are these the kind of warranties that Congress has been seeking to mandate through legislation?

General RYAN. It does address those kinds of warranties, Mr. Chairman. Specifically, it is a reliability improvement warranty type contract with guaranteed performance standards, and that says to the extent the machine fails to live up to its reliability and maintainability goals or its performance characteristics in terms of takeoff and landing distance, range payload, and performance, that the contractor is required to do whatever he needs to do to that aircraft to make it come true.

That would include replacement of failed parts, additional engineering effort, as well as the installation of higher reliability components and parts. We have not used that acquisition strategy on a total airplane system to date. We have had some success with the avionics in the F-16, which has worked out very well.

Moving on, the C-17 does this job with great economies—in our comparisons, as laid out in the airlift master plan, some $16 billion cheaper in terms of life cycle costs over a 30-year period compared to any other aircraft alternative; and, I think very significant to the Congress as well as to us, with 15,000 fewer manpower spaces required.

The health of the military airlift command is excellent today. Our readiness is improving steadily. I think we can show very good progress over the last 3 years, and with the strong support of the Congress that improvement will continue.

Once again, I thank you for the opportunity to testify and I will yield to the next witness.

[The prepared statement of General Ryan follows:]

PREPARED STATEMENT OF GEN. THOMAS M. RYAN, JR., COMMANDER IN CHIEF, MILITARY AIRLIFT COMMAND

THE MILITARY AIRLIFT COMMAND

Mr Chairman and members of the committee, thank you for the opportunity to appear before you today. I want to tell you how we're doing as a command, what our problems are, and how we plan to correct them with your support.

OVERVIEW OF THE MILITARY AIRLIFT COMMAND (MAC)

Who We Are

MAC provides a vital link in our ability to project fighting forces wherever needed across the globe. During peace or in conflict, our role is broad and varied. Our peacetime mission is to maintain the airlift system in a constant state of readiness. MAC's wartime mission is to airlift fighting forces and their equipment from the United States to any area of the world, to maintain a global resupply channel, and to operate within the theater of operation into short unimproved, austere airfields, airlifting fighting forces right to the heart of the battle area.

MAC also provides the air support of joint special operations forces (SOF). These forces, organized and employed in small groups, are capable of conducting independent operations or supporting other friendly forces with timely and tailored combat missions throughout the spectrum of conflict. MAC supports special operations with undetected airlift and, if required, precise airborne fire support.

MAC combat rescue forces have the wartime mission of recovering downed aircrew members, often from behind enemy lines. During peacetime, MAC is the single federal agency responsible for coordination of search and rescue in the inland region of the United States. In 1983, we coordinated the use of our search and rescue forces with those of our sister services, as well as those of civilian and foreign rescue agencies, to save 459 lives--military and civilian. Our combat rescue forces continuously provide a vital peacetime service.

MAC also provides daily worldwide aeromedical evacuation services for the Department of Defense. During periods of conflict, such as Grenada and Beirut, MAC air evacuation flights quickly transport our wounded servicemen to the best medical facilities available.

MAC's Air Weather Service (AWS) provides environmental support to the entire Air Force, the US Army, designated unified and specified commands, and other agencies as directed. During peacetime, AWS support is essential for the protection of military personnel and equipment from severe weather, for safe and efficient air and ground operations, for realistic and productive training exercises, and for effective research and development of weapon systems. During contingencies and wartime, the weather service is vital to the decision-making process in the deployment and employment of air and ground forces.

Finally, MAC's Aerospace Audiovisual Service is responsible for combat documentation. It also provides audiovisual products and services throughout the Air Force and to other government agencies.

Where We Fit

The Nation's ability to mobilize and deploy combat forces rapidly and effectively is an essential element of deterrence, and the key to this ability is airlift. Airlift is the only transportation mode that can place American forces anywhere on the globe within hours. This timeliness can provide the means to establish an initial defensive position to hold back an invading army rather than having to mount a vastly larger force later to regain lost ground. Airlift can also make the difference in combat by insuring a continuous flow of needed supplies.

While today's airlift forces are more capable of supporting national objectives than ever before, the Nation is also placing a greater reliance upon them.

Our Recent Improvements

The health of MAC is good. I am very proud of our people who joined the Air Force for all the right reasons. They wear the uniform proudly and know the meaning of words like patriotism, duty, and honor.

I am also pleased with the continued improvements in our airlift capability, and we appreciate the Congress's efforts in making these improvements possible.

The $27.6 million approved for the C-17 in FY 84 has continued the research and development effort for this vitally important aircraft and will support the full-scale engineering development next year.

Your support for a strong Civil Reserve Air Fleet (CRAF) Enhancement Program resulted in a contract for modifying Pan American Boeing 747s which will permit them to convert these aircraft easily from a passenger to cargo configuration. This civil-military partnership will allow Pan Am to fly the aircraft in daily passenger service and will give us the flexibility to convert them to a cargo configuration during wartime.

The addition of the C-5B aircraft will further add to our intertheater airlift capability, and the increased intertheater outsize capability will complement the total airlift system.

Last year's appropriation to buy eight more KC-10s will also further enhance our mobility capability. In 1983, the KC-10A flew more than 1,500 hours in support of MAC missions, and its refueling capability contributed to MAC's support of US forces in Grenada.

Adding the European Distribution System Aircraft, the C-23, to the MAC fleet will increase the sortie generation capability of our fighter forces in Europe. We will use this aircraft to redistribute spare parts and supplies within the European theater enabling us to increase our fighter force sortie generation by up to 800 sorties per day. Also, with your support, we are upgrading our operational support airlift capability. Small turboprop and light jet transports are complementary to our larger airlift aircraft in providing a balanced airlift fleet. The smaller aircraft allow priority transportation of essential people and cargo without diverting larger aircraft from their tasks. For example, these aircraft flew 52 priority sorties in support of the recent operations in Grenada. Last year Congress authorized us to lease commercial aircraft for the operational support mission, and we have since contracted for 80 C-21A Learjets and 40 C-12F Beech turboprops to modernize the support airlift fleet.

Our Remaining Challenges

MAC people are well trained and highly professional and our equipment is improving. There is still, however, more to be done. We must continue to emphasize our people programs and the modernization of our aging airlift assets while expanding the capability of our airlift system. We can accomplish this modernization and increased airlift capability by implementing the USAF Airlift Master Plan which provides a sound framework for our future airlift force structure. Finally, we must improve our special operations forces and rescue capability to improve our ability to respond to worldwide contingencies. I will discuss each of these at greater length.

PEOPLE PROGRAMS

Our first priority is our people, and we've never had a higher quality force. Our efforts to modernize and enhance our airlift capability will be of little value if we fail to meet the needs of the people who insure the success of our mission.

The morale among our people is high. Our members recognize the important role of airlift in the defense of our Nation. They are aware of the recognition they have received for their sacrifices through the increasing support shown by the Congress, the Administration, and the American public.

Retention

While 1983 was our best year for recruiting, retention of quality people is still a serious concern. It is important that we retain the experienced people we need to operate our complex equipment.

In the enlisted grades, I'm happy to report the Air Force had an exceptional year with record first term and second term reenlistment rates (Figure 1). MAC has mirrored the Air Force rates in all categories.

REENLISTMENT RATES ALL AFSCs - FY 83

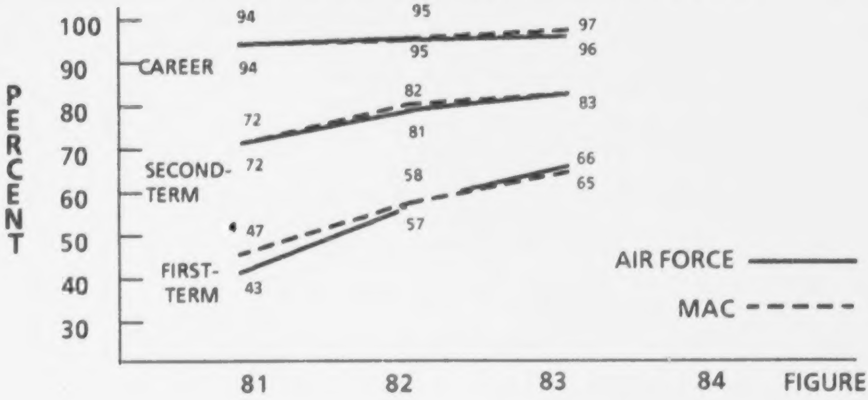
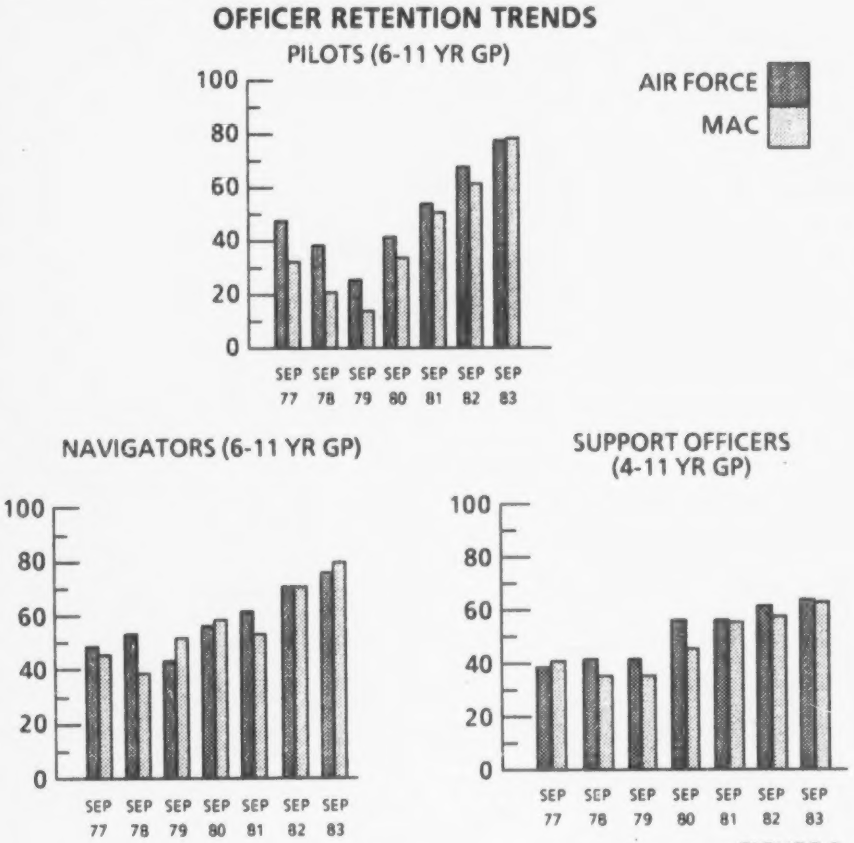


FIGURE 1

Selective Reenlistment Bonuses (SRBs) have been instrumental in retaining personnel in critically manned skills, such as avionics, aircraft, and related systems maintenance career fields.

In our officer force, we are also experiencing excellent retention (Figure 2), with the exception of shortages in some critical career fields, specifically, electrical engineers and physicians. As we learned in the late 1970s, increased hirings both by the airlines and the high technology industries, who are employing potential military recruits as well as our experienced Air Force people, will aggravate this situation.


OFFICER RETENTION TRENDS

PILOTS (6-11 YR GP)

NAVIGATORS (6-11 YR GP)

SUPPORT OFFICERS (4-11 YR GP)

FIGURE 2

Retention and procurement of quality people are of utmost importance to the continued building of a dedicated, experienced, and motivated career force. To maintain and attract such a quality force, we must pursue strong continuing support in all areas of compensation for our people.

Pay and Entitlements

Adequate pay is the heart of our entitlement and retention programs, and our people perceive it as the prime indicator of our Nation's support for the military. We must maintain military pay levels that are fair and competitive, and this requires that pay raises must match wage increases in the private sector.

The current retirement system must remain supportive of our force manning requirements. Our officers and airmen alike are sensitive to changes in the retirement system. Survey after survey has identified the military retirement system as the number one incentive in the decision for a military service career.

Permanent-change-of-station out-of-pocket costs is another decisive factor in both the career decision-making process and the morale of our members. Surveys reveal the government reimburses approximately one in every four dollars of out-of-pocket moving costs which our people incur, and we must take steps to ease this financial hardship. Funding for temporary lodging entitlements, increasing the permanent-change-of-station mileage and weight allowances, providing payment of a second dislocation allowance, and updating the overseas cost of living allowance (COLA) tables are necessary. A great majority of our people view moves as a reduction in pay because of the associated expense they incur. Further, we are finding that financial irritants are affecting our ability to draw sufficient volunteers for overseas assignments. We need your strong support for these moving reimbursement packages as they move toward enactment.

Another factor impacting retention is the impending loss of GI Bill benefits. The GI Bill expires on 31 December 1989, and we need legislation either to extend this expiration date or provide a transferability clause which would authorize a member's dependent(s) to use these benefits.

We have only just begun to replace the 6 to 12-year experienced people lost in such large numbers in the 1978-1980 period, and consequently, we have no cushion with which to soften the blow of repeated losses of skilled people due to retention problems. Therefore, we must provide our people adequate and equitable entitlements. Our key to readiness will continue to pivot on the number of experienced people available to meet the Nation's defense requirement.

AIRLIFT CAPABILITY

Airlift Shortfall

Since 1974, at least 17 major mobility studies have compared established airlift requirements to capabilities. In every case, the findings were that airlift requirements far exceeded our capabilities. The Congressionally Mandated Mobility Study (CMMS), prepared by the DOD and submitted to Congress in 1981, quantified this deficiency. The CMMS recommended a minimum intertheater airlift capability of 66 million ton-miles per day (MTM/D). Parallel to our intertheater airlift shortfall, we also have a shortfall in intratheater airlift capability. Intratheater airlift studies have identified the need for increased theater airlift to and within the battle area and for the critical resupply that must occur during the conflict. We must address both intratheater and intertheater airlift shortfalls to insure we meet national objectives.

To further complicate matters, there is a potential for significant increases in demands for airlift to meet future defense requirements. We expect growth because of new doctrine, new equipment, and enduring global threats. The US Army's Airland Battle doctrine will require rapid movement of equipment and troops to the forward battle areas and laterally across the theater as the battle situation changes. To support this concept, we will require increased levels of both intertheater and intratheater airlift, with outsize capability, increased survivability, and durability.

Present Capability

Today's intertheater airlift force capability, as shown in Figure 3, is less than its potential because of shortages in spares for both C – 141s and C – 5s and less than full crew manning levels for the C – 5 in the Reserves.

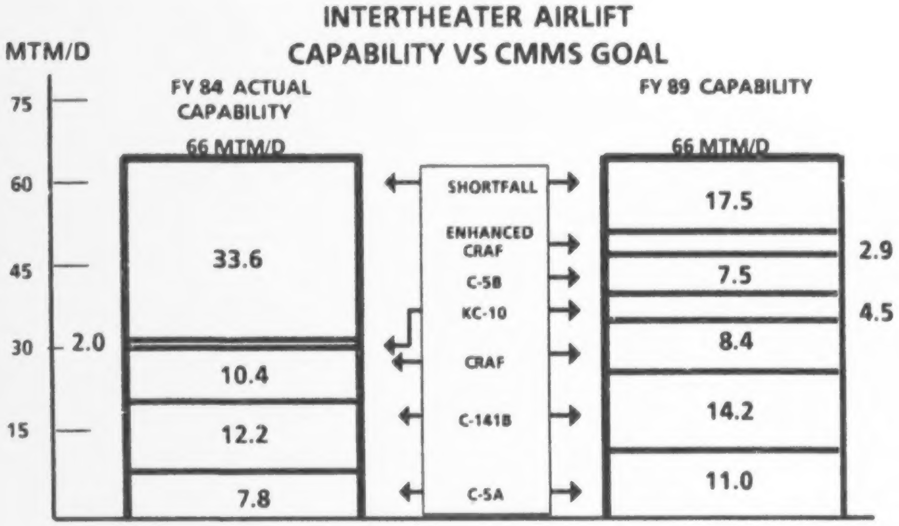


FIGURE 3

This capability will gradually improve with the procurement of 50 C – 5Bs, 44 additional KC – 10s, CRAF enhancement, and the addition of programmed spares and crews. However, even with these programs, we will be about 17.5 MTM/D short of the CMMS's minimum goal.

Limitations on Capability

Any capability estimate is subject to dynamic changes. The projection of a capability of 48.5 MTM/D in FY 89 will only occur if programmed funding continues and force structure decisions--particularly those tied to airlift aircraft acquisition and retirement--remain unchanged. Our current forecasts indicate that we will have to retire the early C – 141 models in the mid 1990s, and the remaining C – 141s shortly after the year 2000 (Figure 4).

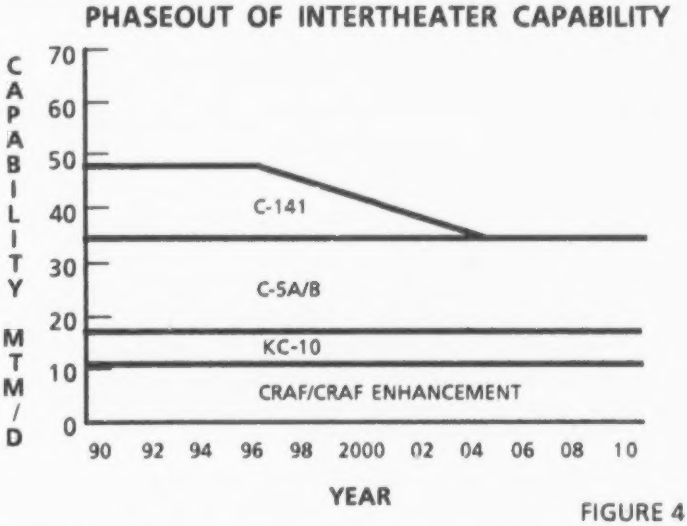
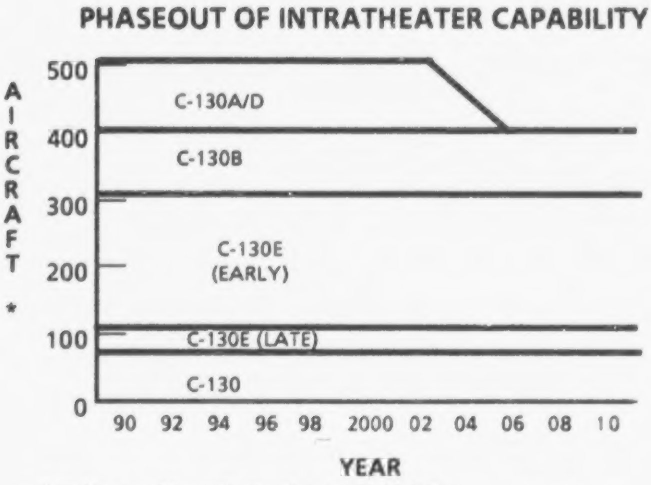


FIGURE 4

Current service life projections for the C – 130s vary considerably by series and production group. As depicted in Figure 5, the service life of many of our C – 130s will end in the early 2000s.

Because of the concurrent and pressing need both to meet the airlift shortfall and modernize the airlift force, the Air Force has carefully developed an Airlift Master Plan. This plan, sent to Congress in December 1983, clearly



* Primary Aircraft Authorized (PAA) FIGURE 5

AIRLIFT MASTER PLAN

identifies an orderly retirement and aircraft acquisition strategy that insures continuing growth in airlift capability while our forces are modernized.

Criteria

The Air Force made the force structure recommendations to meet airlift requirements after thorough consideration of delivery requirements, military utility, cost, manpower, and force modernization.

The first and only absolute criterion was to meet minimum delivery requirements--building intertheater capability to 66 MTM/D while maintaining, as a minimum, today's intratheater capability of approximately 9,000 tons/day (T/D).

Future intertheater airlift aircraft must be able to deliver directly into forward operating locations, operate at austere locations, carry all major types of combat equipment, airdrop combat equipment and troops, and refuel in flight.

Cost factors include acquisition and operating and support (O&S) costs for the useful life of the aircraft. We plan to use existing airlift aircraft in excess of 30 years, so a realistic approach required us to evaluate O&S costs for a 30-year period. Manpower was another consideration because of pressure to reduce manpower costs and the fact that demographic trends forecast a smaller recruiting pool by 1990. Force modernization was an important factor to consider, since most of our C – 141s will reach the end of their service life within the next 20 years and many of our older C – 130s will be increasingly difficult to maintain during that period. When considering replacement aircraft, we must take into account the economies associated with new technology, demands for improved military utility, manpower requirements, and life-cycle costs.

Methodology

While developing the Airlift Master Plan, the Air Force looked at various force structures to determine the most effective method of increasing capability to 66 MTM/D while maintaining a minimum of 9,000 T/D of intratheater capability. Each alternative evaluated the 30-year program costs, consisting of acquisition costs, O&S costs, and manpower requirements.

Recommendations

The force structure recommended in the Airlift Master Plan is depicted in Figure 6. This force structure will contain a balanced airlift force mix of C – 5s, C – 141s, C – 17s, and C – 130s in the active Air Force, Air National Guard, and Air Force Reserves and will comply with total force policy objectives.

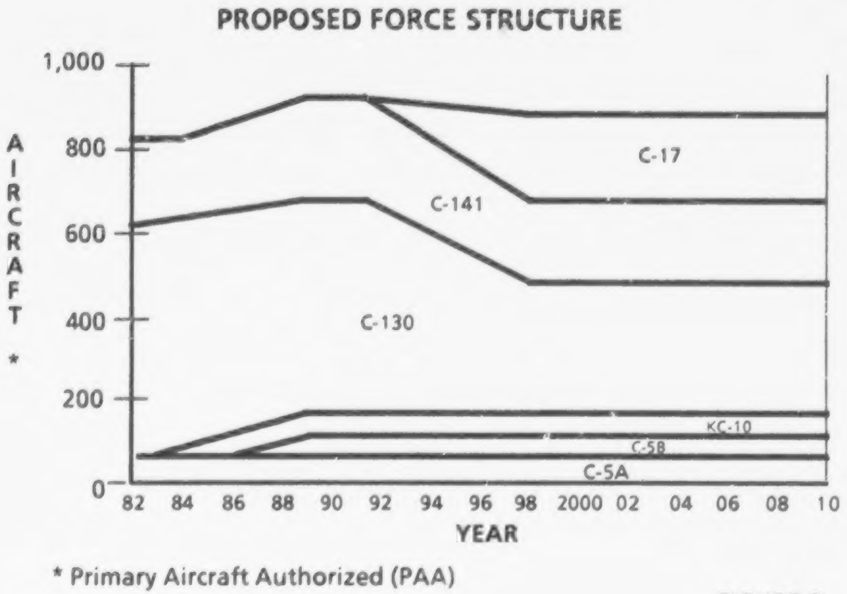


FIGURE 6

C – 17

The above recommended force structure which includes 180 C – 17s best satisfies the full range of inter and intratheater airlift requirements. It will meet the minimum intertheater goal of 66 MTM/D, will increase intratheater capability by 78 percent, will provide our Nation with a modernized force structure, and will minimize operating costs and manpower requirements.

All elements of this force structure are complementary to each other. Our current airlift enhancement programs will greatly benefit our ability to deploy forces worldwide, but these programs address only the intertheater shortfall. The programmed purchase of 50 C – 5Bs will provide a significant share of the intercontinental movement of outsize cargo that is essential in deploying combat forces. The C – 5, with its long range and very large payloads, is an exceptional intertheater airlifter. The size of the aircraft, however, restricts its use to airfields with large ramps and taxiways, and therefore, its intratheater potential is limited. The C-5B was able to fill near-term intertheater requirements with proven capability; however, due to its high manpower requirements and O&S costs, it is not a cost-effective alternative for satisfying our remaining long-term airlift requirements or our need to modernize.

The C-17 is cost-effective alternative for increasing both intertheater and intratheater capability and modernizing our airlift force. The C-17 has been specifically designed to carry large outsize payloads over intercontinental distances, deliver them directly onto runways as short as 3,000 feet, and then efficiently offload in the restricted ground environment typical of forward airfields. This direct delivery capability will reduce both delivery times and congestion at main operating bases by eliminating the need to transfer payloads from intertheater aircraft to intratheater aircraft or ground transportation. It will also give airlift commanders the flexibility to use many additional airfields as alternative destinations when congestion or enemy action closes main operating bases or forward airfields. The C-17's intertheater delivery of combat forces as close as possible to their final destination also reduces the intratheater shortfall by eliminating the need for further air movement.

In its intratheater role, the C-17 can deliver forces or supplies to the brigade level and even further forward if required. Its maneuverability, speed, climb rates, and redundant systems will make it more survivable than any current airlift aircraft. Additionally, compared to the C-130, its larger payload and smaller crew size allow effective risk management by exposing fewer people and aircraft to forward area threats.

The C-17 will not only meet the operational requirements of the airlift system, but will also provide MAC with a modernized force that we can afford to operate into the next century. The C – 17's O&S costs will be comparable to those of the C – 141 it will replace in the active inventory, even though the C – 17 will provide over twice the lift capability of the C – 141. Perhaps even more importantly, the C – 17's low manpower requirements will permit us to modernize our force and increase our capabilities with virtually no increase in manpower levels.

SOF/RESCUE CAPABILITY

Requirements

Special operations and combat rescue perform crucial missions during wartime and in support of peacetime contingencies. The demanding nature of these sensitive missions requires unique aircraft with special capabilities. We must equip our SOF resources in support of national objectives to succeed regardless of terrain conditions or weather environment. As the likelihood of low-intensity conflict increases, we must respond with upgrades of our special operations forces to meet growing mission requirements.

Capabilities and Limitations

Without going into great detail, I will identify certain SOF systems in being and touch on their limits to support contingency requirements today.

Our 14 MC – 130E (Combat Talon) aircraft have the ability to conduct day and night infiltration, exfiltration, resupply, psychological operations, and aerial reconnaissance missions into hostile or enemy-controlled territory using airland, airdrop, or surface-to-air recovery procedures. These are capable aircraft, but they are too few in number. The continued improvement of hostile weaponry, detection systems, and electronic countermeasures has significantly decreased this aircraft's survivability.

Our gunship force consists of 10 AC-130Hs and 10 AC-130As. These aircraft are effective reconnaissance platforms and have side-mounted guns that are especially effective in close air support and interdiction. They are also effective in support of perimeter defense, escort, surveillance, search and rescue, infiltration, exfiltration, illumination, landing zone support operations, and partial command and control roles. These aircraft, however, must operate in a relatively permissive air defense environment since they have limited electronic countermeasures.

We currently have nine PAVE LOW HH-53Hs, modified to permit medium-to high-threat penetrations at night and in adverse weather, and five HH-53Cs, modified to allow night, low-altitude flight in visual conditions to accomplish special operations and combat rescue missions. We also have nine UH-60As, designed for Army combat operations, which require modifications to provide the range, navigational accuracy, and night capability necessary for SOF and rescue missions.

Aircraft age is also a severe problem with much of our SOF/rescue force. The AC-130A gunships are now more than 25 years old. Seven years ago, a wing rehabilitation program extended their service life to the early 1990s. The somewhat newer AC-130Hs will reach the end of their service life early in the twenty-first century.

Our HH-53 helicopters are old, complex, and have a low mission-capable rate. The even older HH-3 helicopters have limited mission capability. Their scheduled retirement is the early 1990s as the HH-60 becomes available. Most of our combat-capable UH – 1Ns are programmed to convert to noncombat support roles in the mid-1990s.

Needed Improvements

The DOD has placed a high priority on improving our SOF and has embarked on a systematic program to modernize and enhance their capabilities.

The procurement of 21 Combat Talon II (MC – 130H) aircraft will provide a long-range infiltration and limited exfiltration capability to support special forces teams charged with conducting operations in hostile or enemy-controlled areas. The aircraft is a C – 130H, modified to include a highly accurate self-contained navigation system with a precision instrument approach capability; a state-of-the-art defensive countermeasures suite; in-flight refueling; a high-speed, low-level aerial delivery system; and internal and external lighting compatible with night vision goggles. The FY 85 budget request includes funds to buy two MC – 130Hs.

We also plan to enhance our vertical-lift capability by procuring the HH – 60 helicopter and the Joint Service Advanced Vertical Lift Aircraft (JVX), and by extending the service life of our aging heavy-lift H – 53 helicopters.

We need the HH – 60 now to correct current shortfalls in SOF capability for medium-lift, medium-range missions and to replace our aging H – 1 and H – 3 combat rescue helicopters. The HH – 60 is a derivative of the Army UH – 60A and includes modifications proven on the Navy SH – 60B. Further enhancements provide the extended range and avionics necessary to carry out SOF missions in support of national objectives and combat recovery of downed aircrew members.

MAC is committed to the development of the JVX. The long range of the JVX will enhance the security of special operations by providing an unrefueled radius which will enable over 60 percent of our special operations targets to be reached. The JVX will correct severe shortfalls in long-range vertical-lift SOF requirements.

The Service Life Extension Program (SLEP) for our H – 53s will improve the reliability of this proven aircraft and provide interim long-range vertical lift capability until the Air Force JVX is operational in 1994. The H – 53 SLEP will make airframe improvements and will upgrade flight control components and electrical, fuel, and hydraulic systems.

REMAINING ISSUES

Transfer of Aircraft to the Air Reserve Forces (ARF)

The Air Force fully supports the total force policy as the way to maintain our wartime capability. The Air Force, in general, and MAC, in particular, are and have been leaders in integrating the ARF into their missions. In FY 84, the ARF will provide about 49 percent of the C – 5 and C – 141 aircrews, 57 percent of the C – 130 force, and 59 percent of the wartime aerial port personnel.

Last year, Congress directed the Air Force to develop plans to transfer at least one C – 141 squadron to the Air National Guard (ANG) and one squadron to the Air Force Reserve (AFRES). Congress further directed the Air Force to provide its plan by 1 June 1984 for phasing additional strategic (intertheater) airlift into the ARF.

To meet end-strength ceilings and partially in response to the above guidance, the Air Force has announced plans to transfer C – 5s to the AFRES beginning in 1985. Additionally, we are developing a comprehensive plan to present to Congress before 1 June 84 for phasing strategic airlift aircraft into the Air Reserve Forces.

We must proceed cautiously to insure this Nation's airlift capability is preserved. The C – 141 is the workhorse of MAC's intertheater airlift force and will remain so until delivery of the C – 17. This aircraft provides the most efficient application of airlift capacity to meet normal lift requirements in support of our worldwide mission. Unique Reserve force obligations preclude the demanding heavy peacetime commitments of long missions and the heavy aircrew staging, alert, and training requirements common to the C – 141. Crew-staging requirements are particularly demanding in support of wartime requirements, peacetime contingencies, and the exercise periods in which we heavily commit C – 141s. The C – 141 is the most heavily tasked MAC aircraft during nonmobilized contingencies and peacetime operations with a peacetime commitment often above 80 percent and recently as high as 88 percent. For example, during the Grenada operation, the C – 141 flew approximately 70 percent of the total deployment missions. During this time frame, the C – 141 concurrently supported more than 55 percent of the other MAC commitments. In many instances, sortie and airframe availability (vice simple, tons-per-day capability) is the primary constraint in meeting worldwide obligations. Any reduction in the number of C – 141s routinely available, especially prior to mobilization of the CRAF, could restrict our ability to simultaneously support our daily and nonmobilized contingency obligations.

On the other hand, the C – 5 has a lower level of commitment than the C – 141 during peacetime and nonmobilized contingencies and is better suited in the near term to ARF operations than the C – 141. More stable mission requirements of the C-5 better fit ARF scheduling limitations. The C-5 normally operates between main operating bases, and C-5 missions are less likely to divert than C-141 missions. Furthermore, due to high operational costs and low peacetime utilization, we do not use C-5s to provide experience to our new pilots. Transfer, therefore, would not adversely impact MAC's ability to absorb and experience the necessary number of pilots to man the active force and supply a trained manpower pool to the ARF. Also, transfer of some C-5s to the ARF will result in better management of the additional peacetime airlift capability that will be available in the late 1980s. We must prudently manage the C-5 in peacetime because of high operating costs and cargo capacity in excess of that needed to distribute normal peacetime cargo loads in the MAC system. The C-5 transfer would also most effectively reduce active duty end strength to be in line with congressional guidance. The transfer of a typical 16-aircraft C-5 squadron would reduce active duty manning by 608 personnel more than the transfer of a typical 18-aircraft C-141 squadron (1,449 vice 841).

To summarize, we propose assigning some C-5s and a number of C-141s to the ARF in the near term and additional C-141s in the midterm as C-17s enter the force. The C-5 peacetime mission, capacity requirements, and the lower O&S costs associated with the Reserve forces indicate the C-5 is well suited to ARF operations, whereas transfer of a large number of C-141s to the ARF, prior to delivery of C-17s, would limit MAC's ability to support nonmobilized contingencies and cost-effectively support our heavy peacetime taskings. We are optimistic that our report to Congress prior to 1 June 1984 will provide the needed roadmap for future airlift force structure development.

End Strength

Manpower end-strength issues are a continuing challenge to us. While we continue our necessary modernization through weapon system acquisition in the outyears, we are confined to near FY 83 manpower force levels. Reliance on Reserve components has always played a significant role in the airlift system, and certainly, we must consider the overall cost-effectiveness. But, there are practical limits to the Reserve force contribution. The budget also constrains the civilian work force, an integral complement of MAC, to FY 83 levels. Congressional guidance on eliminating end-strength ceiling constraints on industrially funded civilians will increase resource effectiveness and improve cost-efficiency. It's probable that removing civilian ceiling constraints on O&M-funded civilians will provide the same benefits.

We are using innovative management techniques to continue our force structure growth with less headquarters manpower. But, there is a limit and, at some point, increases in both the headquarters and in the field will be necessary if we are to accommodate programmed force growth.

For example, the European theater ceiling presents a real dichotomy of effort: hold strengths at the FY 83 level while we plan needed increases in theater capability. Specifically, we need aircraft increases to complement our European commitments--the European Distribution System, another intra-theater airlift C-130 squadron, and the outyear MC-130 special operations forces. We require increased manpower to effect these new capabilities.

Manpower ceilings (active duty end strength, civilian end strength, and European theater) must give to permit increased wartime capability.

CONCLUSION

I'm optimistic about the direction we're taking. Our people programs are strong, but we must maintain them. Our force modernization and enhancement programs are promising, and if maintained, they will provide much-needed wartime capability. The continued support of Congress in bringing these programs to fruition will improve MAC's ability to perform its varied missions and to provide our Nation with reliable, capable, and responsive airlift--the backbone of deterrence.

C-5 AND C-141

Senator **Cohen**. Would you summarize what you are doing with the C-5's, the C-141's, and what the relationship is to the manpower end strength for which you anticipate possible reductions?

General **Ryan**. All right, sir.

Addressing the manpower constraints spelled out in the 1984 authorization bill, which constrained the Air Force to a growth of 2,000 spaces versus 20,200 requested, we have taken the Congress' guidance and looked to the movement of strategic airlift assets into the Air Reserve Forces. Our initial effort in this regard will be eight C-5A's moving to Kelly Air Force Base in San Antonio, displacing C-130's in an Air Force Reserve squadron, building eventually to 14 aircraft.

We then plan additional moves of C-5 aircraft over the next 3 years to both Guard and Reserve units totaling 34 primary assigned aircraft. We are also responding to the Congress' direction to provide, by the first of June of this year, a plan for the transfer of C-141 aircraft in the near term to the Guard and Reserve, and I believe that will begin in fiscal year 1986.

Senator **Cohen**. OK.

Admiral Walters?

STATEMENT OF VICE ADM. ROBERT L. WALTERS, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SURFACE WARFARE, U.S. NAVY

Admiral **Walters**. Good morning, Mr. Chairman. It is also a pleasure for me to be here and testify to this committee, and I would also request that my prepared statement be entered into the record.

Briefly the Navy is endeavoring to provide its part in the strategic lift capability through various means, specifically the amphibious ship program which supports our forcible entry capability. Your committee is very familiar with that program, which consists of several new efforts that have occurred over the last 3 years, specifically the LSD-41 class amphibious ship: the LHD-1 class, the first of which was authorized and appropriated last year; the new Landing Craft Air Cushion, which provides a unique new capability to move forces ashore from further offshore and permits us to disperse these forces faster once we have selected a place to put them ashore in conjunction with helicopter assaults: and, finally, the modernization through a service life extension program of an existing class of ships called the LPD-4 class.

This in conjunction with the effort that we are putting into sealift, the ability to off-load sealift in unimproved ports which will be covered by Admiral Avrit, represents what we think is a very balanced approach overall to providing our part of the sealift deployment.

I thank you, sir.

[The prepared statement of Admiral Walters follows:]

Prepared Statement of Vice Adm. Robert L. Walters, U.S. Navy, Deputy Chief of Naval Operations for Surface Warfare

Mr. Chairman and members of the committee, I am Vice Admiral Robert L. Walters, USN, the Deputy Chief of Naval Operations for Surface Warfare and the Amphibious Force Sponsor. I am pleased to have the opportunity today to present to you the Amphibious Force portion of this hearing.

Amphibious Warfare is a unique capability developed and perfected jointly with the U.S. Marine Corps during World War II. It is a uniquely fashioned force designed for forcible entry—there is nothing defensive about Amphibious Warfare. Amphibious operations in combat epitomize the strong heritage of the Marine Corps, and the Navy is proud to be a part of this vital concept. I intend to emphasize our continued support of this offensive mission as an essential part of our Maritime Strategy. General Glasgow has already addressed you on our overall capability and I will attempt to provide you with some details which will give you a better view of specific Navy programs which support our Amphibious Warfare mission.

In developing plans to expand the Navy in seeking to revitalize our maritime strength we quickly concluded that we must increase our amphibious lift capability and correct known deficiencies in craft, systems and equipment which support amphibious operations. Our inititatives are far ranging and designed to achieve a balanced increase in tactical air, naval gunfire support, amphibious forces, CH-53E helicopters, assault craft, sealift, prepositioning, cargo handling and off-loading equipment and general increases in ordnance and supplies.

You are aware of our Near Term Prepositioned Force ships which have been in or near Diego Garica since 1980. There are now eighteen ships in this force of which five contain equipment, supplies and ordnance to support a Marine Amphibious Brigade for thirty days of combat. The upgrading of this capability with additional, more capable ships to ultimately support three Marine Amphibious Brigades is continuing with funds already provided by the Congress, and we expect to meet the objectives established for these forces by the Secretary of Defense. Rear Admiral Avrit is here today to provide you with the latest programs in the vital areas of Assault Follow on Echelon [AFOE] shipping, Strategic Sealift and maritime prepositioned forces.

Amphibious Lift plays a key role in the objective of achieving a "600 ship Navy". Although a host of factors are taken into account in determining total forces levels, the primary factor in determining the Amphibious Force level and ship design is the Marine Corps lift requirement. In the stated goal for 1994 is the capability to lift the assult echelons of both a Marine Amphibious Force [MAF] and a Marine Amphibious Brigade [MAB]. The Assault Echelon [AE] is composed of the most critical assault elements needed to seize a beachhead and rapidly build up combat power ashore. These elements must be transported, landed, and supported from specialized amphibious ships in order to successfully conduct an amphibious assault. The remainder of the landing force makes up the Assault Follow-on Echelon [AFOE], comprising the troops, equipment and supplies needed to support and sustain the initial assault. These follow-on landing force elements are embarked in Military Sealift Command [MSC] controlled fleet ships, which may be government-owned and chartered or requisitioned from the private sector.

Generally speaking, the Assault Echelon contains about 75 percent of the personnel, a little more than half the vehicles, 20 percent of the dry cargo and supplies, and 10 percent of the POL. This leaves 25 percent of the personnel, a little less than half the vehicles, 80 percent of the dry cargo and supplies, and 90 percent of the POL for the AFOE ships.

TABLE 1.—1994 ASSAULT ECHELON LIFT REQUIREMENT

	Vehicle		Cargo (cubic feet × 1,000)	Helo (Ch-46 equiv.)	LCAC/LCU/LCM-8
	Troops	(Square feet × 1,000)			
MAF(AE) + NSE	37,800	760	1,790	467	65/9/38
MAB(AE) + NSE	12,200	280	700	166	25/4/16
Total	50,000	1,040	2,490	633	90/13/54

TABLE 2.—1984 AMPHIBIOUS SHIP LIFT CAPACITY

Troops	Vehicle (sq. ft. X 1,000)	Cargo (cu. ft. X 1,000)	Helos (Ch-46 equiv.)	LCAC/LCU/LCM-8
40,634	791	1,720	427	31/14/73

The Marine Corps has defined and stabilized the equipment and troops that go into making up the assault echelons of a MAF and MAB through the 1990's. This lift requirement equates to 50,000 troops and associated Naval Support Elements, 633 helicopters, 2.5 million cubic feet of combat cargo and 1.1 million square feet of combat and support vehicles (table 1). An extension of the lift requirement equates to types and numbers of ships. Another factor that must be taken into account in the design of our ships is the amount of well deck space required to lift the boating assets required to execute the surface portion of the ship to shore movement. Well deck space to lift 90 LCACs, 13 LCUs and 54 LCM 8s is needed to support the Assault Echelon of a MAF and a MAB.

The amphibious force will consist of 61 ships at the end of this fiscal year, excluding the two AGFs which are converted LPDs and designated to support Commander Middle East Force and Commander Sixth Fleet flagship requirements. These 61 ships provide us a capability to lift approximately 41,000 troops plus Naval Support Elements, 427 helicopters, 791 thousand square feet for vehicles, 1.7 million cubic feet for cargo and the well deck space fo lift 31 LCACs, 14 LCUs and 73 LCM-8s (table 2). Lift shortfalls are primarily helicopter spots and cargo cube capacity.

AMPHIBIOUS FORCE
1984 - 1998

CLASS	CURRENT INVENTORY	FY															
			84	85	86	87	88	89	90	91	92	93	94	95	96	97	98
LHA-1	5																
LPD-1 *	2															-1	-1
LPD-4 *	11																
LPH-2	7														-1	-1	-1
LKA-113	5																
LSD-28	6		-2	-1		-1			-2								
LSD-36	5																
LST-1179	20																
LCC-19	2																
LHD	0							+1		+1	+1	+1	+1		+1	+1	
LSD 41	0			+1	+1	+1	+2	+2	+1								
LSD 49	0									+1	+2	+2	+1	+1	+1		+1
TOTAL	63		61	61	62	62	64	67	66	68	71	74	76	77	78	77	76

* SHIP TOTALS DO NOT INCLUDE USS LA SALLE (AGF-3), COMMIDEASTFOR FLAG SHIP AND USS CORONADO (AGF-11)

TABLE 3

The five year shipbuilding program is designed to alleviate these shortfalls and increase our amphibious force to a total of 76 ships by 1994. (See table 3—Amphibious Force 1984-1998). A comparison of table 1 and table 4 shows that the lift capacity of these 76 ships would meet Marine Corps lift requirements by 1994.

TABLE 4.—1994 AMPHIBIOUS SHIP LIFT CAPACITY

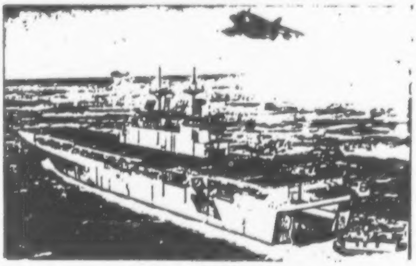
Troops	Vehicle (sq. ft. x 1,000)	Cargo (Cu. ft. x 1,000)	Helo (C4-46 equiv.)	LCAC/LCU/LCM-8
55,184	1,071	2,612	637	90/13/54

The trend to building more capable ships is reflected in our selection of the LHD 1 Class ship which is a modification of our largest existing class, the LHA. Design changes from the LHA will emphasize increased capability to carry three LCACs and facilities for Aviation Intermediate Maintenance [AIMD] to support a detachment of four to six AV-8B vertical/short take-off and landing aircraft in the primary amphibious assault mission. In addition to her primary mission of amphibious assault, the LHD can be converted in a short time at minimum cost to a secondary mission of force projection and sea control. The ship is designed to permit expansion of the aviation support facilities and aircraft rearming when the ship is to be used in her secondary mission. Such augmentation will allow the LHD to support a minimum of twenty AV-8Bs and six SH-60B helicopters, but true amphibious capability will be reduced to accommodate the alternate mission.

AMPHIBIOUS ASSAULT SHIP - LHD 1

Mission:

To embark, deploy and land elements of a major Marine landing force in an assault by helicopters, VSTOL aircraft, landing craft and amphibious vehicles. The LHD class may be converted to operate AV-8s in the attack role.



CHARACTERISTICS

			OFFICER	ENLISTED
LENGTH:	844 FT	CREW: INCLUDES CATF AND STAFF	98	982
NAV DRAFT:	26 FT 8 IN	BEAM:	106 FT	
PROPULSION:	STEAM	FULL LOAD DISPLACEMENT:	40,600 Tons	
TROOP CAPACITY:	1,873	SPEED:	20+KTS	
HELICOPTER CAPACITY	42 CH-46 equivalents	LCAC:	3	

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM	LONG LEAD	$39.2 MILLION	INGALLS

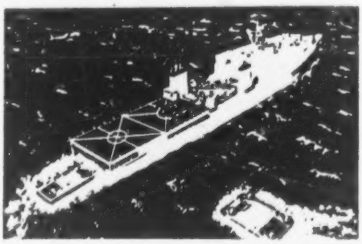
In fiscal year 1984, the Congress appropriated full funding for the lead ship of the LHD class. This year we are requesting long lead funding in the amount of $39.2 million for the second ship of the class which is planned for fiscal year 1986. The three LHD 1 Class ships requested in the Navy's five year plan (one in fiscal year 1986, one in fiscal year 1988, one in fiscal year 1989) will bring the total requested to four thus far, and will provide a significant increase in amphibious lift capability. A total of five is required to meet the 1994 lift goal and five more will eventually be required to replace the LPH-2 class in the late 1990's.

In fiscal year 1984 Congress approved the President's request for a five ship, three year multi-year procurement with certain conditions for the LSD-41 class. The Department of the Navy received competitive proposals from industry for both multi-year and annual procurement with priced options. An evaluation of all proposals led to the award of one ship in fiscal year 1984 with priced options for additional ships in fiscal year 1985 and fiscal year 1986. The competition for this contract was intense and resulted in substantial procurement savings.

LANDING SHIP DOCK - LSD-41

Mission:

To transport and launch loaded amphibious craft and vehicles with their crews and embarked personnel in amphibious assault operations.



CHARACTERISTICS

LENGTH:	609 FT
NAV DRAFT:	19.5 FT
PROPULSION:	DIESEL
SPEED:	20+KTS

	OFFICER	ENLISTED
CREW	18	337
BEAM:	84 FT	
TROOP LIFT:	504*	
LCAC:	4	
FULL LOAD DISPLACEMENT:	15,745 Tons	

* 338 Troops plus 102 surge capacity; 64 assault craft unit accommodations.

FUNDING REQUEST	NUMBER	COST *	BUILDER
FY 1985 PROGRAM:	2 SHIPS	$489.5 MILLION * INCLUDES ADVANCE PROCUREMENT	AVONDALE

The two ships requested in fiscal year 1985 represent the fifth and sixth ships of the LSD-41 class. The lead ship, under construction by Lockheed Shipbuilding in Seattle, Washington, is proceeding on schedule and will deliver in November 1984. Lockheed is also building the second and third ships of the class. Avondale Shipyards Inc. has been awarded the contract for the fourth LSD-41, with options to build up to four more of this class through fiscal year 1986.

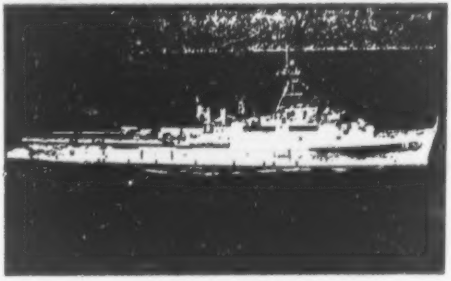
This construction program will give us eight ships of the LSD-41 class. While the five year plan shows construction of a ninth and tenth LSD-41 in fiscal year 1987, we expect to shift to a variant of the LSD-41 in fiscal year 1987 which would have additional cargo lift capability and reduced well deck space. Lift requirements are a major driver in amphibious ship design; however, occasionally we can make reasonable tradeoffs. It appears feasible to modify the LSD-41 design to provide more square feet for vehicles and more cubic feet for supplies and equipment while reducing wet well space to better satisfy our overall lift requirements. Therefore, in lieu of LSD-41 class ships in fiscal year 1987 we expect to introduce the LSD-49 class as a modified LSD-41. The balance of our amphibious force requirements will be filled by the LSD-49 class which replaces the LPDX now shown in the five year plan as a fiscal year 1988 start.

AMPHIBIOUS SERVICE LIFE EXTENSION PROGRAM

LPD 4 SLEP

Mission:

To transport and land troops and their essential equipment and supplies by means of embarked landing craft or amphibious vehicles augmented by helicopter lift.



CHARACTERISTICS

LENGTH:	570 FT
NAV DRAFT:	23 FT
PROPULSION:	STEAM
TROOPS:	930
HELICOPTERS:	6

	OFFICER	ENLISTED
CREW:	24	373
BEAM:		106 FT
DISPLACEMENT:		16,700 Tons
SPEED:		20 + KTS
LCAC:		1*

* After SLEP

FUNDING REQUEST	COST	INDUSTRIAL SITE
FY 1985 PROGRAM:	$15.0 MILLION (Advance Procurement)	TBD

Without a service life extension program for the LPD–4 class, we will be unable to achieve our lift goals through the 1990s. The LPD–4 class is approaching the mid point of the traditional thirty year service life for Navy ships. These ships are in good material condition and are excellent candidates for a fifteen year service life extension.

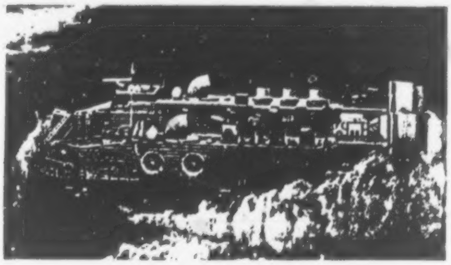
This is a prudent and highly effective method to ensure adequate lift for the future. The first LPD–4 SLEP is planned for the private sector in fiscal year 1987. The SLEP will provide improved survivability and engineering plant modernization as well as self protection systems such as CIWS, SRBOC and SLQ–32 systems. Additionally, the LPD–4 class will receive well deck modifications to operate one LCAC.

Increasing our lift capability is only part of the solution needed to improve our forcible entry posture. The helicopter was introduced into the amphibious force in 1958 giving it the capability to launch troops and air transportable equipment from a standoff distance. However, the surface assault and movement ashore of tanks and heavy equipment by slow, conventional landing craft continued to require the Amphibious Task Force to remain close to the shore.

LANDING CRAFT AIR CUSHION - LCAC

Mission:

The LCAC program has been established to transport weapon systems, equipment, cargo, and personnel of the assault elements of the Marine Air/Ground Task Force from ship to shore and across the beach.



CHARACTERISTICS

LENGTH:	87 FT 11 IN
BEAM:	47 FT
PROPULSION	GAS TURBINE
CARGO DECK AREA:	1,809 SQ FT

	ENLISTED	
CREW:	5	OPERATOR ENGINEER NAVIGATOR LOAD MASTER DECK HAND ENGINEER
DESIGN PAYLOAD:	60 Tons	
OVERLOAD PAYLOAD:	75 Tons	
SPEED:	40 KTS with payload	
RANGE:	200 NM with payload	

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM:	9 CRAFT	$230.1 MILLION INCLUDES ADVANCE PROCUREMENT	BELL AEROSPACE/TEXTRON

Both the increased risk to our forces and modern technology have brought us to the use of air cushion craft to complement the helicopter. The Landing Craft Air Cushion Vehicle [LCAC] is the key to our concept of operations in the 1990's and beyond. That concept is based on an undisclosed over-the-horizon assault from 25 to 50 miles offshore using both LCAC and helicopters as compared to 1 to 2 miles in the past.

The importance of the LCAC in improving our tactical choices against hostile shores can not be over emphasized. Future amphibious assaults will capitalize on the speed of the Amphibious Task Force and the 40 knot plus speed of the LCACs and helicopters to deny enemy alertment and positioning of anti-assault forces. A modern Amphibious Task Force can be nearly 500 miles away from the objective at H-Hour minus 24, transit the last 200 under cover of darkness and make a pre-dawn attack launched beyond the enemy's horizon.

The LCAC provides a four-fold increase in beach areas accessible to our amphibious forces because it is not restricted by tides, beach gradients and surf conditions. The mere presence of air cushion vehicles in the Amphibious Task Force greatly complicates the enemy's efforts to mass an adequate force to repel the assault by increasing the number of potential landing sites or the expanse of shoreline he must be prepared to defend. The air cushion capability also allows the LCAC to proceed inland to discharge its cargo on dry, trafficable terrain thus removing the significant buildup of troops, equipment and material at the surf zone which is characteristic when using conventional landing craft. Additionally, the overall survivability of the Amphibious Task Force is enhanced during the initial assault through the ability to keep the ships over-the-horizon at longer ranges and to disperse them as necessary thereby lessening the enemy's ability to correctly guess where to employ mines and construct elaborate beach defenses. The LCAC also increases the survivability of the landing force by permitting a more rapid buildup of combat power ashore and in places he may least expect it.

FY 1985 will be the fourth year of LCAC production. To date twelve craft have been appropriated and the first two will deliver by March of next year. These craft can be carried in varying numbers in LSD's, LHA's, LPD's and LHD's, and we have tailored our force levels and ship configurations to accommodate the 90 LCAC needed to support a MAF and a MAB.

This year Navy is requesting $230.1 million for nine LCACs which includes $31.3 million in advance procurement for future production. A total of 57 LCACs are contained in the 5 year plan submitted with the fiscal year 1985 budget.

As part of a continuing Navy program to upgrade equipment used by Amphibious Naval Reserve units in support of our one-Navy concept, $11.9 million is requested in the fiscal year 1985 budget for conventional landing craft for the following Naval Reserve Units: 2 LCU: 1—LCU DET 110, Orange, Texas; 1—LCU DET 205, Buffalo, NY; 3 LCM-8: 3—LCM DET 1613 Great Lakes; 2 LCM-6: 2—LCM DET 2605 Cleveland, Ohio.

To improve our cargo handling and equipment offloading capability, the Navy is continuing to procure two heavy lift geat sets ($263K) in fiscal year 1985 used in loading the new Side Loadable Warping Tugs [SLWT] on LSTs. The SLWTs replace the causeway pusher boats which occupied valuable well deck space. Additionally $230K has been requested for two fuel lines for the Amphibious Assault Bulk Fuel System [AABFS] which are needed to move fuel from offshore to the beach.

In concluding my remarks, the following viewgraph show the specific amphibious ships requested in the fiscal year 1985 budget.

CRAFT

	Quantity	Funding (million)
Program:		
LCM-8	3	$1.9
LCM-6	2	1.3
LCU	2	8.7
YTB	6	26.4
YP	7	26.1
YD	3	19.2
YC	10	5.0
YFN	6	4.5

Mr. Chairman, this concludes my presentation of the Amphibious Forces. I am pleased to have had the opportunity to appear before your committee and I stand ready for your questions.

Senator COHEN. Thank you, Admiral Walters.

Admiral Avrit?

STATEMENT OF REAR ADM. RICHARD C. AVRIT, DIRECTOR, STRATEGIC SEALIFT, OFFICE OF THE CHIEF OF NAVAL OPERATIONS, U.S. NAVY

Admiral AVRIT. I appreciate the opportunity to appear before this subcommittee today and offer into the record my prepared statement. It covers in the aggregate the details of the Navy's strategic sealift program and I would like not to repeat those details now.

Instead, I would like to address the circumstances which necessitate such a program. The requirements for strategic sealift are driven by two distinctly separate factors. The first is the concurrent lift requirement needed to move and sustain the Army, Navy, Air Force and Marine Corps forces worldwide to support military operations.

The second factor is the result of the continuing decline of the U.S. merchant marine industry and the programs we have had to initiate to compensate for its inability to support fully our lift requirements.

The first factor driving our strategic sealift program is the size of the sealift requirement itself. This requirement is tightly integrated and balanced with airlift and sealift capabilities and with prepositioned material both ashore and afloat. It reflects the carefully-considered commitment of DOD resources necessary to support strategic sealift elements of our mobility forces.

The second factor driving our program is more complex and relates to two national security wartime shipping requirements, first the sealift required to support the economy and, second, the sealift required to support the defense requirement.

To meet the wartime defense needs we must requisition essentially all militarily useful ships, resulting in nearly total dependence of the wartime economy and mobilization based upon foreign flag shipping. As a military planner, I am concerned over this wartime economic dependence upon foreign flag shipping with essentially no U.S.-flag fleet flexibility.

In meeting defense shipping requirements we have had to compensate for the loss of U.S. shipping capability by establishing and maintaining a Ready Reserve Force, 32 ships to date, growing to 77 in 1988. This force must offset the shortfall in sealift that can no longer be attained from the U.S. merchant marine.

The trend of the U.S. merchant marine toward highly specialized container ships has necessitated more innovative solutions on our part to use these ships more effectively to handle oversized equipment that simply will not fit in a container. This has led to the sealift enhancement program, a program that provides the equipment necessary to adapt government and privately-owned U.S. merchant ships to perform a specific military mission.

The final element of our strategic sealift program is the cargo off-load and discharge systems needed to move materials and petroleum products ashore under a wide range of operational, environmental and geographic conditions through a structured port or with no port at all.

The well-recognized ship-to-shore movements supporting an amphibious assault and its follow-on echelon is paralleled with other Marine Corps and Army requirements for force projection ashore, but in a permissive environment. Our cargo offloading and discharge programs are coordinated with the Marine Corps as well as the Army, who is responsible for providing systems in their area of operations.

While the Navy budget only provides systems to support Marine Corps operations there are many which clearly have joint service applications and we are developing these with the Army. Whenever possible, we seek commonality among the services.

I would like to make one final comment about the U.S. merchant marine industry. The Navy is vitally concerned with the health of this industry—the ships that comprise it, the pool of trained, experienced mariners that man it, and the shipbuilding and repair base that supports it. Our strategic sealift program placed $2.1 billion into this industry in fiscal year 1982 through 1984, and we will place an additional $4.8 billion over the next 5-year defense plan.

However, defense initiatives alone cannot sustain this industry. Its primary purpose is economic shipping in peace. It must be large enough to do that job in war.

Thank you again for this opportunity to describe the elements of the strategic sealift program. I would be pleased to answer any questions at the appropriate time.

[The prepared statement of Admiral Avrit follows:]

PREPARED STATEMENT OF REAR ADM. RICHARD C. AVRIT, U.S. NAVY, DIRECTOR, STRATEGIC SEALIFT, OFFICE OF THE CHIEF OF NAVAL OPERATIONS

Mr. Chairman and members of the committee, I am Rear Admiral Richard C. Avrit, USN, the Director of Strategic Sealift for the Chief of Naval Operations. It is a distinct pleasure to appear before this committee and report on our progess in achieving the requisite capability to project military forces in support of national security objectives.

Strategic sealift program requirements derive not only from the need to support Marine Corps and Navy amphibious operations, but also to support Rapid Deployment Force operations and to reinforce NATO when required. In recognition of these growing requirements, Navy recently added to its traditional functions of Sea Control and Force Projection, a third function of Strategic Sealift. As a result, my position as Director for Strategic Sealift within the office of the Deputy Chief of Naval Operations for Logistics was established on 1 January in order that proper oversight and planning may be given to a program of this magnitude.

Before embarking on a review of those elements of strategic sealift to be found in the President's budget for Fiscal Year 1985, I would like to make some general observations about the availability of sealift as viewed by a military planner. Admiral Walters has referred to the amount of cargo consisting of personnel, vehicles, resupply and petroleum products [POL] that must be lifted in the Assault Follow-On Echelon [AFOE]. This has been a long-standing requirement. However, the force size necessary for forcible entry has grown. Today we are capable of putting a Marine Amphibious Force ashore almost anywhere in the world and sustaining it indefinitely. This is a force of about 45,000 Marines, equipped to fight, trained to win, and backed by over 200 years of experience, history and tradition. By 1994, the planned force capable of amphibious assault will increase to nearly 60,000 Marines consisting of a Marine Amphibious Force [MAF] and a Marine Amphibious Brigade [MAB].

During World War II, and for a few years following, thea men, equipment and POL required in the AFOE were carried in Navy cargo and transport ships manned by Navy personnel. By the early 1970's, the demise of our World War II fleet and the demands on shipbuilding resources to rebuild the combatant fleet resulted in a decision to transport the AFOE in commercial ships manned by merchant seafarers. This decision contained an element of added risk to the success of an amphibious operation, but was justified on the basis of the superb record of the merchant marine in World War II to carry the resupply essential to the battle for Europe and the Pacific Island campaign. It was this record that earned the U.S. merchant marine the title of our "Fourth Arm of Defense." However, the added role of transporting the AFOE means that most merchant ships performing this function must arrive in the objective area within five days following the initial invasion by the Assault Echelon. We are confident of our ability to do that today, but are concerned for the future.

If support of the Marine Corps were our only task, there would be little reason for concern. However, our defensive concept is one of forward employment as opposed to one of a fortress America. Therefore, the requirements for strategic sealift are much larger, and are sized for concurrent sealift for U.S. Army, Air Force and Marine Corps forces and to sustain these forces—as well as the Navy Battle Groups—with resupply sealift for as long as required. Some material and most personnel will be airlifted to areas of operation, but sealift will handle about 95% of all military cargo needed to support military operations worldwide. It is in this larger context that I would like to make my general observations about strategic sealift.

GENERAL

There are three major elements of our strategic sealift program: (1) The government- and privately-owned ships capable of carrying military cargo; (2) those sealift enhancement features that adapt merchant ships to a military cargo auxiliary role; and (3) the lighterage and cargo handling assets necessary to move cargo from ship-to-shore when required by military plans. Our strategic sealift program is tightly integrated and balanced between airlift and sealift capabilities and with prepositioned material, either ashore or afloat. It reflects the carefully considered commitment of DOD resources necessary to support the strategic sealift elements of our mobility forces. I would like to discuss each element generally before presenting the specifics of our FY 85 program.

SHIPS

National security in war is supported by two independent shipping requirements: (1) The sealift required to support the economy and its wartime industrial base, and (2) the sealift required to meet our defense requirements. These defense requirements are met by a combination of government- and privately-owned U.S. merchant ships. The government-owned ships are operated by the Military Sealift Command in peace as well as war. Some of the privately-owned ships are currently under charter to MSC for peacetime support; others would be added in war as required to meet our defense shipping needs. It is this private sector contribution to our wartime sealift that is indispensable in meeting military lift requirements.

In the mid-70's, the decline of the U.S. fleet had progressed to the point where it could no longer support defense sealift requirements. Consequently, a high readiness component of the National Defense Reserve Fleet [NDRF] called the Ready Reserve Force [RRF] was established under the administrative purview of Marad to provide the lift capacity that is missing from the U.S. merchant marine. The continuing decline of the U.S. merchant fleet has now required increasing the size of this government-owned Ready Reserve Force to 77 ships by 1988—61 dry cargo ships and 16 tankers. A joint study is currently being conducted by OSD to define our tanker requirements beyond the 16 established by Navy. Additionally, our projections of the rate at which U.S. flag ships would be laid up or scrapped by industry have been exceeded by recent events in the U.S. shipping industry. In short, we are reviewing both the dry and refined product lift requirements and expect an upward adjustment in the government-owned RRF to offset the continued U.S. flag fleet decline.

I do not want to give the impression that we rely solely on U.S. flag merchant ships—government- or privately-owned. Part of our sealift requirement would be handled by Effective U.S. Controlled [EUSC] shipping. As you know, these are ships majority-owned by U.S. companies. They are requisitionable assets, but foreign crewed. This introduces an element of risk in planning as does the use of allied shipping—particularly in a go-it-alone scenario. Even by factoring in allied-committed shipping and EUSC shipping, we are unable to offset the peacetime decline of U.S. flag shipping.

SEALIFT ENHANCEMENT FEATURES

The projected trends of the U.S. flag fleet composition also impact upon our strategic sealift program. Trends toward containerization and larger clean product tankers portends the need to be more innovative and aggressive in adapting these specialized ships to our military needs.

Nonself-sustaining container ships are comprising an ever larger segment of the U.S. flag fleet. Although these ships are highly competitive in moving cargo quickly on or off a ship, they require a developed port structure with cranes and handling equipment for the containers. In military operations one cannot count on an operative port so we must be prepared to offload container ships independent of working port facilities and, if required, outside the port or offshore. This leads to specialized ships such as our crane ships [TACS], which I will discuss later, that are specifically designed to offload our military cargo from these container ships.

In general, the newer ships are larger, with smaller crews, oftentimes slower than the older ships. The overall trend in dry cargo ships is away from the well-known breakbulk ship with its large cargo holds and booms for self-unloading to containerships which rely on large cranes, located in the ports they serve, for offload. Although there is an active program within the Department of Defense to move to containerized cargo wherever possible, many of the implements of war simply do not fit into a box with an 8 X 8 foot opening. This is only one of the reasons why the Navy has had to establish a Sealift Enhancement Features program containing more than twenty individual features to permit merchant ships to carry military equipment or do military functions in time of war. These Sealift Enhancement Features are divided into three subcategories based on specific requirements for unique mission capabilities. Addressed in each of the three subcategories is the equipment and ship modification necessary to achieve the desired military mission utility for selected merchant ships.

The first subcategory, platform improvements, provides quick insert systems for ships. Some platform improvements, such as Sea Sheds and flatracks, are designed to permit the carriage of large military vehicles and outsized breakbulk cargo on container ships. Others, such as Lash lift beams, permit the loading of oversized lighterage on Lighter-Aboard Ship [LASH] vessels.

The second subcategory provides underway replenishment equipment and ship modifications so that the Mobile Logistic Support Force [MLSF] ships which support our battle groups can be resupplied at sea by commercial ships and thus remain on-station for longer periods. This portion of the program also provides an austere wartime augmentation delivery capability for POL or dry cargo replenishment to combatant ships directly from merchant ships. This achieves an overall increase in wartime replenishment flexibility.

The third subcategory is general in nature and provides for a variety of ship modifications or equipments that are designed to increase the military utiility of merchant ships in time of conflict. Such features as additional lighterage carrying capability; increased communications; nuclear, biological and chemical washdown systems, and hard points or tie-downs for deck loading of military equipment or offload systems are all included in this category.

In general, our Sealift Enhancement program provides equipment necessary to adapt government- and privately-owned U.S. merchant ships to perform a specific military sealift mission. Our plan is to install these mission-related features in all government-owned ships.

CARGO OFFLOAD AND DISCHARGE SYSTEMS

The ability to project and sustain our military forces ashore worldwide is an essential element of our mobility force planning. The will recognized ship-to-shore movement supporting an amphibious assault and its follow-on echelon is paralleled with the other USMC and Army requirements for force projection ashore, but in a permissive environment. Our planning does not rely fully on modern, developed ports, but allows for port damage or closure and, in some cases, no port at all. This requires, therefore, a capability to move our military cargo and refined petroleum products from ship-to-shore under a wide variety of operational and environmental situations.

Our cargo offload and discharge programs are coordinated with the U.S. Marine Corps, as well as the U.S. Army, who is responsible for providing systems in its area of operation. While the Department of Navy budget only provides systems to support USMC operations, there are many which clearly have joint service application and we are developing these with the Army. Whenever possible, we seek commonality between all services.

U.S. MERCHANT MARINE

Before continuing with our fiscal year 1985 program overview, I would like to express a concern about the present state of the U.S. merchant marine industry. As I've expressed earlier, shipping is required to support our national economy in war. To meet our defense needs we must requisition essentially all militarily useful ships to meet those needs, resulting in nearly total dependence of the wartime economy and mobilization base upon foreign flag shipping. As a military planner, I am concerned over such complete dependence upon this source, with essentially no U.S. flag fleet flexibility. We are vitally concerned with the health of our merchant marine—the ships that comprise it; the pool of trained, experienced mariners that man it; and the shipbuilding and repair base that supports it. Our strategic sealift program placed $2.1B into this industry in fiscal year 1982 through fiscal year 1984 and will place an additional $4.8B over the fiscal year 1985–89 Five-Year Defense Plan. However, Navy initiatives alone cannot sustain the health of the U.S. flag fleet. Its primary purpose is economic shipping in peace. It must be large enough to be available to do similarly in war. The ailments sapping the strength of this industry have helped create the continued and increasing burden of DOD having to develop programs necessary to offset the loss of our "fourth arm of defense."

FISCAL YEAR 1985 STRATEGIC SEALIFT PROGRAM

Let me turn now to the major elements of strategic sealift contained in this year's budget request.

First, the Near Term Prepositioning Force [NTPF] consisting of 18 ships continues to provide the capability to respond quickly to potential contingency situations in Southwest Asia. Together with naval forces of the Seventh Fleet, a degree of stability in that area, evidenced by the continued flow of crude oil, has been established. The NTPF now includes 7 breakbulk ships, 3 RP/RO ships, 3 Lash and 5 tankers. Five of these ships provide equipment plus 30 days of support for the Seventh Marine Amphibious Brigade. The remainder provide ammunition, general support for the Army and Air Force and common user fuel. Next month, two of the Army breakbulk ships will be replaced by a single Lash ship which is both more militarily useful and economical in this region of the world. Also in this year's budget is a request for funds to support the prepositioning of an additional ship in the NTPF loaded with Army offload equipment. This equipment, consisting of lighterage, cranes, cargo handling equipment and trucks, is required early in contingency operations to offload and transport unit equipment and combat support equipment. This additional ship has been designated an Auxiliary Lighter Ship [TALS] which will be contract manned and operated by the Military Sealift Command. Navy will commence a similar prepositioning effort in FY 86 for Navy offload systems in support of Marine Corps requirements.

Next, the Maritime Prepositioning Ship program will combine the responsiveness of airlifted troops with equally responsive sealift delivery of combat equipment. This program will pre-position the equipment and 30 days of sustaining support for three Marine Amphibious Brigades. The 13 TAKX ships to be used to warehouse this equipment worldwide are presently being constructed or converted by private industry and will be leased by the Navy upon delivery. They will be formed into three squadrons, deployed globally, but able to respond to Southwest Asia on short notice. Together they provide a significant increase in the Navy/Marine Corps ability to project power where needed. The third MPS squadron will replace the five ships in the NTPF now supporting the 7th Marine Amphibious Brigade. All 13 ships will be manned by civilian contract crews and placed under the administrative control of the Military Sealift Command. All aspects of this program are on or ahead of schedule.

The next improvement in sealift to meet mobility requirements I would like to address is the TAKR program which conerts eight former SL–7 class container ships to partial Roll-On/Roll-Off [RO/RO] ships for the rapid deployment of Army forces. Four of these ships will complete conversion this year and the remainder will be completed next year. The first four ships will be maintained in a ready status on-berth near Jacksonville, Florida, and New Orleans, Louisiana. Berths for the last four ships have not yet been selected. This program is also on or ahead of schedule.

Earlier I mentioned our goal of a 77-ship Ready Reserve Force necessitated by the decline in the U.S. merchant marine. Whether we can limit the RRF size to 77 ships depends entirely upon our ability to forecast the future size of the U.S. flag fleet. If the trend spirals downward faster than expected, we will have to revise our goal for the RRF upward accordingly. In the past we acquired ships for the RRF from turn-ins to the NDRF in exchange for Construction Differential Subsidy [CDS] funding.

With the disappearance of CDS funding the Navy requested, and the Congress authorized and appropriated, $31 million in FY 84 for the procurement of used merchant marine ships that were excess to industry needs. That procurement is currently in progress. Additionally, we still continue to receive a few ships from the NDRF as well as MSC ships that are being retired. We expect to realize a net increase of 16 ships this year which will raise the size of the RRF to 48 ships. This keeps us on schedule as we move towards our goal of 77 ships. The FY 85 budget request again contains a request for $31 million to procure ships from private industry, as well as funding to maintain our growing inventory of RRF ships.

We have three other ship conversion or modification programs in progress. The first is the TACS or Auxiliary Crane Ships which adds commercial marinized cranes to a standard merchant container ship in order to provide an offload capability for itself and other nonself-sustaining container ships in austere or damaged ports. The first crane ship, the Keystone State, is nearing completion and will begin post delivery testing in June.

The budget contains a request to modify two ships of the RRF to lift two Intermediate Maintenance Activity [IMA] facilities to support Marine Corps fixed and rotary wing aircraft. This is the TAVB or Aviation Support Ship program. Because of the scarcity of strategic airlift assets to lift the organic IMA vans and facilities, as well as the need for them to be functional on arrival, a sealift capability providing enroute and in-theater aircraft maintenance support is required. The alternative is a large aircraft spares inventory to accompany the aircraft that would cost many times as much as the TAVB program. After transition of the IMA ashore, the TAVB ships are available for common user sealift. We expect one TAVB to be forward based in the Far East near the USMC equipment it will carry. The second ship will be located on the East Coast. Both will be maintained in a high readiness condition for contingency requirements.

The final on-going conversion program is the TAH or Hospital Ship program. Prior year funding provided for the procurement and conversion of two San Clemente class tankers to provide 24 operating rooms and 2,000 beds for afloat definitive medical care. The TAH program is on schedule and progressing well.

Finally, I must tell you that ships and the necessary enhancement features to make them militarily useful do not necessarily get the job done. If you can't unload the cargo in a timely manner, and under a wide range of operational and environmental conditions, the soldier, marine or airman on the firing line goes without. For this reason, the Navy's program includes systems to offload in the stream breakbulk, containerized and rolling cargo, as well as bulk liquid products including POL to support forces operating ashore. The basic building block for cargo offload is the causeway section, a concept in use since World War II. The addition of a power unit to the basic causeway has made it a self-powered lighterage asset in the ship-to-shore movement of cargo. By mating the powered causeway with one or more nonpowered causeways, it becomes a causeway barge ferry which can carry bulk or containerized cargo from a ship moored in the stream to an elevated causeway pier [or ELCAS] for loading onto trucks. It can also be used to ferry vehicles offloaded from a RO/RO ramp made up of causeway sections directly to the shore. By addition of a winch and A-frame to the powered causeway section, we have a workboat to assist in the installation of ELCAS, RO/RO ramps and fuel systems.

A major subsystem of the cargo offload program is the bulk liquid discharge system. The very significant requirements for fuel to keep a force operating ashore is currently addressed by several systems which do not fully meet our operational requirements. Initially, in an assault scenario the amphibious ships carry a floating hose system to get the cargo fuel carried by the LST class ship ashore from one mile offshore. Augmenting this, 135,000-gallon bladders can be added to ferry fuel from a large tanker offshore until a higher capacity, more durable system can be installed. In response to congressional direction in the 1984 budget, Navy is procuring a commerical offshore POL discharge system, consisting of a single point mooring system and flexible pipe system to discharge fuel from tankers up to four miles offshore. This first system will be ready for demonstration this fall.

All of the foregoing Navy programs I have mentioned have manpower implications. The ship programs rely heavily on seafarers of the U.S. merchant marine. With due regard for my concern expressed earlier, we continue to count on them to do the job. If this commercial capability further declines, we must seek alternate solutions. Our offload system programs operate in such close proximity to combat operations that the use of military personnel is necessary. Today, for example, we have one active duty Cargo Handling Battalion and six Reserve Battalions. This budget request is for equipment that supports a program that will double the number of Reserve Cargo Handling Battalions. Training of the Reserve Cargo Handling Battalions—including Army—will be accomplished by berthing a few RRF Crane Ships [TACS] on both coasts along with the requisite lighterage, Sea Sheds, Flatracks and associated cargo handling equipment.

I would like to emphasize that the strategic sealift program contained in this budget request is a balanced program designed to move military equipment anywhere in the world without incurring bottlenecks at any point from loadout through discharge. It has been closely coordinated with the Army and Marine Corps with the benefit of the insight obtained from the recently concluded DOD Sealift Study.

In order that you may have an overview of the scope and balance of this program, I am offering into the record a table depicting in aggregated form, the various elements of strategic sealift and the associated costs for both the budget and authorization years. I am prepared to provide you any detailed information you may desire.

TABLE 1.—STRATEGIC SEALIFT PROGRAMS SUMMARY

	Funding (millions)	
	Fiscal year 1985	Fiscal year 1986
Program:		
Maritime prepositioning	$392	$652
Ships	188	246
Sealift enhancement features	43	91
Cargo offload and discharge systems	98	136
Total	721	1,125

Thank you for this opportunity to appear before this committee and describe the elements of strategic sealift that are so essential to mobility. I earnestly solicit your continued support.

REBUILDING MERCHANT MARINE

Senator COHEN. I may have one or two questions as we go through, but, Admiral, I have been sitting here for almost 6 years now and each year we always complain about not having enough ships and the dire state of our merchant marine. But nothing is ever done about it.

What would you recommend in the way of rebuilding the merchant marine, because DOD does not seem to take much of an interest in the program and there is very little interest on the commercial side of things? But where is the impetus going to come from?

Admiral AVRIT. Well, first of all, the interest is very great in the Navy.

Senator COHEN. It is very great in concern and expression, but I do not see any dollars being allocated or programs being undertaken that receive a high enough priority in the Navy's budgets to really do something about it.

Admiral AVRIT. Well, we have, of course, moved specifically toward those initiatives which provide the sealift required to fulfill the military requirement, at least cost to the Government. Now that forces us into certain strategies. For example, the ships of the RRF, which I cited, represent a way in which we in the Navy have relieved from the industry those ships no longer economically viable and have put them into a highly Ready Reserve status.

That has provided some relief. At the same time, it has put money into the repair industry to maintain them. Of course, we would like not to have to put money into a Ready Reserve Force. It is the least-cost way to provide the lift requirements.

If we had a large, robust merchant marine, we would not have to build that kind of a force. It was in the mid-1970's when this requirement first surfaced and since the mid-1970's we have been marching progressively down this path to satisfy the defense lift requirements independent of the health of the U.S. merchant marine.

Senator COHEN. Well, we will come back to that subject during the general discussion.

General Glasgow?

STATEMENT OF MAJ. GEN. HAROLD G. GLASGOW, DIRECTOR, OPERATIONS DIVISION, PLANS, POLICY AND OPERATIONS DEPARTMENT, U.S. MARINE CORPS

General GLASGOW. Mr. Chairman, I, too, am appreciative of the opportunity to come and discuss the Marine Corps goals in sea power and force projection, and I would like my prepared statement entered into the record.

Before proceeding, sir, if I could, I would just like to say that, with regard to our projection capability, we are trying to orient our Navy and Marine Corps capability toward the threat that we are most likely going to be confronting.

That is not to say we are not concerned with the Soviets, because we very definitely are, but theirs is not the threat that we consider most likely for us in the next two to three decades. We are not particularly concerned about the threat posed in Falklands-Grenada type operations because we feel that the assets that we have are fully capable of handling that type of operation.

For instance, the MAU that participated in Grenada you have not heard too much about, sir. The reason is that after five landings down there they packed their gear and sailed, without returning home, right on out to Lebanon, went in and relieved the force there and will be coming back home about the first of May.

Now we are very proud of that outfit and we are going to be there to shake their hand when they return, but sir, the point is that we have 26 others just like that spread throughout our corps. So we feel that we have an adequate show of force and brushfire capability.

Our concern, sir, is toward an enemy or aggressor that has air parity and requires that we able to quickly build up combat power ashore, have tactical mobility there and sustainability or get run out. I am talking about basically, sir, threats like Korea, Cuba, Syria and the type where you have to go prepared and have to have the right kind of gear with you to do it.

This brings us to a new concept in amphibious operations: the over-the-horizon launch requirement that we are working conjointly with the Navy and making a lot of headway with now, sir. The Navy has refined the Landing Craft Air Cushion to the extent that it is real, now, sir, actually underway. The first operating base is being prepared at Camp Pendleton now for the receipt of the first production models.

I want to also emphasize our interest in the JVX, the CH-53E, the heavy-lift helicopter that goes along with this concept and the service life extension program of our LVT's, which is currently underway—the landing vehicle, the track vehicles.

The reason for our excitement in the new concept is that it provided flexibility for the commander in selecting landing areas. We may never intend to cross a heavily defended beach again. We would not have done that in World War II if we had been able to avoid it. But with the LCAC and the helicopter capability that we have today we may not have to be concerned with it in the future. We can go where the enemy is not. This gives us tremendous capability and a considerable enhancement. So these programs are of vital concern to us and we are delighted that they are underway and that you have continued to support them.

Along with new concepts, sir, comes our light armored vehicle. We are pleased with the production model of the LAV-25 that is currently being delivered at the rate of about 16 per month. This rate will continue until we have a battalion in each of our divisions.

We still are working on the mission role vehicles that are involved, the mortar vehicle, the command and control vehicle, the recovery vehicle, logistics vehicle, and an antitank-type vehicle, which is the base-line vehicle with a TOW on it.

These are programs that are of vital concern to us, and we are most appreciative of the fact that we are allowed to move on with them because we do have that capability in hand now, sir. That is very comforting to us.

Although Admiral Walters did not bring it out, I want to emphasize our support for the Navy's amphibious shipbuilding program, and especially the fact that the LSD-41 class has continued to receive support. Three of those are currently under production, the keel being laid for the fourth—extremely important to us. They are an elite amphibious ships. They give us capability to carry the Landing Craft Air Cushion as well as other amphibious equipment.

The LHD-1, which is essentially a followon of the LHA, our largest amphibious ship, is well underway with anticipated delivery in 1989. We, for the first time in my 33 years in the Marine Corps, can say that we in the Marine Corps are absolutely satisfied with the new amphibious ship construction plan that is underway. Again, it is certainly comforting.

Also, I want to finish up by saying, sir, that we are delighted with the four battleships. A lot of people thought that they were decorative in nature when they were first discussed, but the *New Jersey* has proven its worth. The other three *Iowa* class that are following will certainly provide us with naval gunfire support that allows us to be assured of that capability today.

Thank you, sir. I do not want to be a Pollyanna about it, but I am very pleased with our program.

[The prepared statement of General Glasgow follows:]

PREPARED STATEMENT OF MAJ. GEN. HAROLD G. GLASGOW, U.S. MARINE CORPS, DIRECTOR, OPERATIONS DIVISION, PLANS, POLICY AND OPERATIONS DEPARTMENT

Mr. Chairman, distinguished members of the committee. I welcome this opportunity to share with you my views on Seapower and Force Projection. I will begin with a brief discussion of the Nation's maritime strategy and the role of the Navy/Marine Corps Team in implementing that strategy. The remainder of my statement will address those programs and efforts which will enhance our ability to execute this critical role.

To meet the maritime aspects of national security strategy, naval forces must be capable in four mission areas: Strategic deterrence; sea control; power projection; presence.

Marine Corps forces have the potential for contributing directly to the last three of these missions and contributing indirectly to strategic deterrence through the prevention of crisis escalation.

The use of naval forces to project U.S. influence or power in support of sea control, power projection, and maritime presence missions is accomplished primarily through the positioning of forward afloat deployed amphibious forces and/or amphibious forces organized and deployed to respond to a specific situation.

Amphibious forces can best serve the national interest and strategy guidance by placing emphasis on three distinct functions: Warfighting; deterrence; influence projection.

In my remarks I will highlight Marine Corps capabilities and usefulness in the context of their contribution to the naval strategy. While emphasis will be placed on the amphibious environment, it should be viewed as but one aspect of the total role of Marine Corps forces in support of our maritime strategy. The balanced forces in Marine Air Ground Task Forces [MAGTF] together with a high degree of readiness and flexibility, enable the Marine Corps to be partiicularly useful and effective in conducting other types of combat operations to contribute to the naval effort. While we in the Marine Corps will continue to focus on amphibious power projection, there are a number of other force projection options which supplement, complement, and enhance this primary focus and the role of the Marine Corps in the national military strategy. I will discuss these options later in my statement.

APPLICABILITY OF AMPHIBIOUS OPERATIONS TO NAVAL WARFIGHTING

The amphibious operation is, by its very nature, a form of naval warfare and has direct applicability to well established and recognized naval missions; i.e., strategic deterrence, naval presence, sea control, and power projection. While an amphibious strike capability enhances U.S. credibility and offers expanded options in each mission area, it is the latter two—sea control and power projection—which offer the broadest range of opportunity for application of the amphibious option.

Sea control is a derivative of the traditional phrase control of the sea, and it acknowledges the limitations on ocean control brought about by the advanced development of the submarine and the airplane. It also acknowledges the growing naval strength of the Soviet Union and can be viewed both strategically and tactically from two directions—denying the enemy the right to use some seas at some times, and asserting our own right to use some seas at some times. Sea control encompasses several national objectives: Ensuring economic and military supplies for the U.S. and its allies; reinforcing and resupplying military forces engaged overseas; safeguarding naval forces engaged in power projection.

Amphibious operations can facilitate sea control by: Destroying enemy ships, submarines, and aircraft or their support facilities; destroying or incapacitating enemy shipbuilding, supply, maintenance, fuel, communications, command and control, or early warning and air defense facilities; distracting, dislocating, and misleading enemy forces which could interdict Allied sea control forces; dislodging enemy forces anchoring key strongpoints or geogrpahical chokepoints supporting defensive or offensive barriers; interdicting land links in enemy sea lines of communications; countering enemy power projection forces supporting sea control expansion operations.

Projection of power, in its purest sense, is concerned with the impact of naval forces—amphibious, naval bombardment, and tactical air—on land forces or objectives. Power projection operations may be conducted toward, inter alia:

Securing land areas from which to launch and support land or air campaigns; destroying, interdicting, or denying enemy uses of facilities or key areas and lines of communication; reducing an enemy's war-making potential while denying him the same option against us.

Beyond naval aspects, power projection can accomplish many of the same missions outlined above, but in support of friendly land campaigns or by harrassing and interdicting enemy ground campaigns.

I have touched upon the spectrum of potential amphibious missions encompassed by established naval missions. Before moving on to the areas of deterrence and influence projection I would like to make one final point and that concerns the fountainhead of all amphibious operations, the amphibious task force or ATF. The ATF is a naval force—a balanced Navy/Marine Corps team. It must be fast moving and hard hitting. It embodies the best balance of strategic and tactical mobility, armor protection, firepower, and logistic self-sufficiency that intelligent task organization of Navy and Marine Corps assets can accomplish for a given place, time, duration, and mission. Amphibious plans and dispositions are kept flexible—adaptable to circumstances—and call for a line of operations which offer alternative objectives. The ATF is a reusable offensive option that is tailored to the modern battlefield; it capitalizes on strategic as well as tactical maneuver. The Marine Corps, as the Nation's force-in-readiness with amphibious expertise, satisfies many of the requirements for responsive, controllable, selective, and convincing forces to meet the diverse and unpredicatable contingencies of a world scenario. A quarter of a million miles of world coastline is largely undefended. Most nations do not defend their coast; they defend their borders with their neighbors. Coastal defenses are costly resource consumers which offer few visible returns; they are easy to neglect and, therefore, are vulnerable to properly planned amphibious operations. In 1759 Thomas More Molyneux wrote: "A military, naval, littoral war, when wisely prepared and discretely conducted, is a terrible sort of war. Happy for that people who are sovereigns enough of the sea to put it into execution! For it comes like thunder and lightning to some unprepared part of the world." Molyneux's comments are as applicable today as they were in his time.

EMPLOYMENT OF AMPHIBIOUS FORCES IN SUPPORT OF NAVAL DETERRENCE AND INFLUENCE PROJECTION

In addition to the warfighting function, Marine Corps forces, as amphibious forces, provide a ready and responsive means of performing deterrence and influence projection in support of sea control, power projection, andmaritime presence missions.

For deterrence, amphibious forces can be positioned in waters adjacent to an area of potential crisis or conflict and provide a selective level of visibility/combat power to meet the requirements of a particular situation. These forces may be either forward afloat deployed amphibious forces or amphibious forces organized and deployed to respond to a specific crisis. Typical activities suitable for amphibious forces in support of the deterrence function are:

Presence, with variable visibility, which: Provides a means of showing U.S. interest without commitment of forces, or of selectively committing forces ashore; keeps precise U.S. employment objectives unclear to possible adversaries.

Evacuation of U.S. and foreign nationals and protection of U.S. property which: Provides for rapid response and immediate employment of forces upon arrival in the objective area; allows for selected commitment of a self-contained, balanced force.

Assistance to allies which may include: Operating from the sea in order to avoid high visibility and high cost commitment ashore; selected application of support consistent with tactical and/or diplomatic objectives; conducting combined training exercises; providing contact teams and advisors.

Influence projection. In a complex world characterized by confrontation diplomacy, competing national interest, and uncertainty, the constraints on the overt use of force enhance the political use of force short of war. Amphibious forces are capable of serving as an integral and coordinated element of U.S. foreign policy through peaceful projection of U.S. influence into desired areas. The successful projection of influence during time of peace is fundamental to a national strategy designed to deter conflict and maintain peace. The strength of the amphibious force (coupled with diplomatic signaling) lies in: readiness, responsiveness, versatility, and a self-contained, combat ready posture. The implication is that the amphibious force in peacetime symbolizes national rather than naval power, and as such its effectiveness is proportional to the influence of the former and not the later. When introduced to demonstrate the commitment of U.S. power in all its dimensions, the tactical capability of the amphibious force does not define the limit of its political effectiveness. Political effectiveness is more apt to be determined by third party perceptions of the balance of power rather than the actual capability of the force itself.

Be they used latently or actively, amphibious forces can be effective instruments for executing national policy decisions. In peacetime they provide U.S. presence and political leverage without involvement or automatic commitment, a distinct political advantage. Because of their mobility and flexibility, they can be used as a visible show of force, or they can cover wide areas and be shifted to meet changes in U.S. strategic interest with little or no consideration of diplomatic constraints. They can responsively support national strategy and react immediately to the direction of the

National Command Authorities. In the future, the lack of strong and ready amphibious forces would be a critical weakness, not only to the Navy/Marine Corps team, but also in U.S. diplomatic ability to influence the perceptions of other countries in ways favorable to U.S. interest.

SUPPLEMENTARY/COMPLEMENTARY CONCEPTS

Although particularly suited for amphibious employment within the context of naval strategy, the Marine Corps must continue to be strategically mobile, tactically flexible, immediately available, and fully capable of executing missions which transcend the maritime role. Specifically, the Marine Corps will continue to remain fully prepared to accomplish a full range of warfare mission requirements which, although not necessarily amphibious in nature, nonetheless make a subsantial contribution to the prosecution of a naval campaign. Such employment is not to be viewed as a role that competes with the primary amphibious role codified in Title 10. Rather, such employment seizes upon the historical usefulness and highly favorable results of prior nonamphibious employment experiences and provides reinforcement to the national perspective that the Marine Corps is the Nation's primary force in readiness.

Just as the employment of amphibious forces in general, and the concept of the amphibious forcible entry in particular, expand the dimensions of naval strategy, so does the projection of Marine Corps forces expand the Nation's ability to respond rapidly to a wide variety of contingencies. The Marine corps embodies those characteristics necessary for such a force. It is: designed to fight as a combined arms team; directed by an integrated command and control system; supported by an integrated logistics system; possesses the only true expeditionary tactical aviation package in the U.S. arsenal.

FORCE PROJECTION OPTIONS

The introduction of credible and survivable U.S. forces into a crisis area (actual or potential), or as reinforcement of forward positioned forces is dependent upon: Environment (benign or hostile; timeliness of NCA decisions; size of force required; availability of strategic mobility assets, both air and sea; force closure time.

Fundamental to execution of either operation cited above is the timeliness of reponse. Ideally, crisis response means execution with such rapidity that the adversary (actual or potential) is presented with a fait accompli. Recognizing that this is not always achievable, it means timely and rapid execution to meet the political and/or military demands at the scene. Response time in any case can be reduced in essentially four ways: First, by receipt of strategic warning to permit anticipatory deployments by air and/or sea; second, by forward afloat positioning of forces and associated equipment; third, by strategic air movement of forces, complemented by forward positioning of associated equipment; fourth, by overseas basing.

It is anticipated that Marine Corps execution of its crisis response and reinforcement roles will continue to be shaped by the realization that neither international affairs nor adequacy of funds will allow additional forces to be permanently stationed at overseas locations. Forward stationing of forces on land sacrifices flexibility, but it is important when there must be a physical deterrent between opposing ground and air forces, or when there must be a highly visible and totally credible evidence of commitment to the security of an area. In terms of Marine Corps forces, forward pre-positioning, coupled with amphibious shipping and strategic air/sealift assets, provides a rapid in-theater response capability.

Forward afloat deployed Marine Corps forces embarked in amphibious shipping are viewed as the cutting edge of future U.S. force projection capability. They are intended to deploy and to be committed as an integral, fully combat capable unit, but they also have the capability to: incrementally deploy lesser-size MAGTFs; converge deployed units to form a larger MAGTF; accommodate expansion through infusion of other Marine Corps forces projected by strategic air and/or sea lift.

Such forces can be selectively deployed, at controlled levels of visibility and with limited dependence on foreign bases. In this respect they provide the optimum degree of precision in demonstrating U.S. interest in a given situation, without the irrevocable commitment involved in placing forces ashore. The role of forward afloat deployed forces, at least as the first manifestation of U.S. involvement in a crisis situation, is expected to play an increasingly important role in our National maritime strategy.

The demonstrable adequacy of U.S. strategic mobility is a factor critical to the responsiveness of Marine Corps forces not maintained in a forward-deployed status. Ideally, the strategic mobility means should be immediately available to rapidly load and quickly transport forces and large quantities of equipment over long distances without refueling, staging, or requiring any nation's permission for transit. In addition, safe and secure movement should be assured and forces should be deposited in the objective area as a cohesive, tactical unit, ready to fight. Obviously this ideal is difficult to achieve and the airlift force option complemented by prepositioned equipment does not result in a force for all occasions. Nonetheless, the projection of CONUS-based forces by strategic airlift, complemented by the pre-positioning of materiel on land and at sea, can be viewed as a key force-building option to augment committed or forward deployed forces. This concept provides assurance that the initial undertaking will have continued momentum. The concept can also be viewed as a preemptive response, providing an economy-of-force measure whereby through early deployment of a smaller force during a crisis and/or before hostilities, the employment of a larger force to seize the same area should hostilities commence is obviated.

To summarize this portion of my statement, I would close by saying that the Marine Corps can be viewed as a National Force in Readiness. Such a role calls for a force that offers the broadest utility and flexibility for the projection of U.S. interest abroad by complementing U.S. diplomcay with military strength as required. Viewed as a national force in readiness, the Marine Corps can appropriately be described as a reusable force projection asset. Inherently, this descriptor confers certain features to the force. It must: Provide or support a rapid and flexible military response to Presidential directives; be configured for long distance, forcible entry; be configured and considered for a wide range of missions.

The foregoing description reinforces the Marine Corps' role in the National military strategy by fulfilling the need for a highly mobile, efficient, combat ready force, a force which can be deployed rapidly as the nation's quick strike capability, and possessing an inherent capability to sustain operations once initiated.

SEAPOWER AND FORCE PROJECTION ENHANCEMENTS

In the first portion of my statement I indicated that the introduction of credible and survivable U.S. forces into a crisis area was dependent upon, among other things, the size of the force required and the availability of strategic mobility assets. The necessity to successfully match the force requirement with the Navy's amphibious lift capability resulted in what the Commandant called in his Posture Statement: "perhaps the most singularly important event in the field of amphibious matters . . . . the DON Long Term Amphibious Lift Requirement and Optimum Ship Mix Study." This study presents balanced programs to provide the assets required to conduct amphibious assaults with a Marine Amphibious Force [MAF] and a Marine Amphibious Brigade [MAB] by 1994. It does so at least cost. The proposals in the study meet Defense Guidance (to lift the assault echelons [AEs] of a MAF and a MAB), support an innovative concept of operations and insure a credible amphibious warfare capability for the 1990's. Because of the importance of this study, I believe it is important to highlight some of its key results. These provide insight into Navy/Marine Corps amphibious warfare programs for present and future.

During the course of the study amphibious lift requirements, troops, vehicles, cargo cube, helicopter and landing craft spots, etc., for the 1990's MAF and MAB assault echelons were developed. These 1990's requirements were the result of an extensive evaluation of the assault combat worth of each element of the AE. We asked ourselves the question "was it essential that this item be embarked in AE shipping (Navy amphibious ships) or could it arrive immediately following the assault, embarked in Assault Follow On Echelon shipping (commercial, MSC, etc.)." The key point to be made here is that, although we reduced the sheer bulk of the AE lift requirement, the initial fighting punch of Marine assault force has remained unchanged. As the Commandant has stated, "we are lean—but lethal."

The study developed a concept of operations which optimizes the capabilities of the landing craft air cushion [LCAC] and the helicopter. This combination of LCAC and helicopter allows the option for all of the assault elements, including the amphibious assault vehicles (embarked in the LCAC's), to be launched from over-the-horizon [OTH]. The OTH concept of operations was found to be very appropriate for sizing the forces to be programmed for the 1990's. Inherent, and this point is very important, in the capability to conduct assaults from OTH is the flexibility to execute other landing plans tailored to specific scenarios. Utilizing this highly capable mix of ship-to-shore [STS] assets permits both the rapid buildup of combat power ashore and the protective cushion of stand-off distance for amphibious ships.

Before proceeding, I would like to take a moment to discuss the STS assets employed in the OTH concept as they are critical to its success—LCAC, JVX, and the

CH-53E. Additionally, I'll say a few words about two very important tactical mobility enhancements—the LVT-7 Service Life Extension and Light Armored Vehicle [LAV] programs.

The Marine Corps has firmly supported the LCAC program from its inception in order to achieve an OTH capability. A total of 90 operational LCAC are required by 1994 to support the DOD mid-term objective (simultaneous amphibious lift of the AEs of a MAF and a MAB). Although the DON has announced an intent to second source, further perturbations in the present program may seriously jeopardize the attainment of at least a MAB size OTH launch capability in each Fleet at the earliest possible date and the objective of 90 operational LCACs by 1994.

As regards helicopter STS movement, the study developed a mix of STS assets that will best meet the Marine Corps' requirement for the rapid build up of combat power ashore. We found that, with the exception of the CH-53E/JVX mix, there was no combination of existing or modestly upgraded helicopters which could meet the Marine Corps operational mission essential assault element lift requirements and remain within the stabilized constraint of 633 CH-46 equivalent deck spots without disproportionately and unacceptably increasing the risk to the Landing Force. We also found this mix provides us with vast improvements in both strategic mobility as well as speed, radius, and surprise which are required to meet the opposing forces threat of the 1990's and beyond. Further, to the tactical commander, these aircraft represent a heretofore unavailable advantage in battlefield mobility and flexibility. A mix of aircraft which includes the CH-53E and JVX provides the smallest inventory to meet these requirements and, therefore, avoids the additional manpower associated with alternative aircraft mixes, a highly significant factor given our constraints on force levels. It should also be noted that these aircraft will replace our current aging helicopter transports in a squadron for squadron progressive modernization to a force of all CH-53E/JVX aircraft by the mid to late 90's.

The Long Term Lift Study validated a DON requirement for at least six CH-53E squadrons to support a MAF and MAB amphibious assault. In regard to JVX, I can only reemphasize General Kelley's statement that "JVX promises an unprecedented advance for the projection of seapower and a quantum leap in both strategic mobility and tactical flexibility." We in the Marine Corps strongly support the JVX program not only for our own applications but also as a breakthrough in American technology for all Services as well as future civil applications.

Assault Amphibian Vehicles [AAV] serve to further reduce our vulnerability during the critical ship-to-shore movement and continue to serve as the principal means of tactical mobility for the infantry through the mid-range period. To enhance the continued operational capability and supportability of AAVs, the Marine Corps has commenced a LVT-7 Service Life Extension Program [SLEP]. This effort is specifically aimed at curing deficiencies in the LVT-7 family of vehicles identified since their introduction in 1972, upgrading some of the vehicle components to a state-of-the-art level, and thereby extending the service life of the LVT-7 into the 1990's. The SLEP will cover the 984 LVT-7's in the current inventory. During 1984, the first AAV unit will be completely equipped with the new LVT-7A1. To support MPS forces, delivery of 333 new LVT-7A1's will commence this fiscal year. Delivery of new production vehicles will be completed in December 1985, and the delivery of SLEP vehicles will be completed in June 1986.

The Light Armored Vehicle [LAV] will add depth and versatility to the battlefield as well as firepower. LAV battalions, soon to be organic to each Marine division, will provide a mobile, hardhitting, maneuver element to the MAGTF commander's arsenal of capabilities. LAV battalions will be capable of both strategic (sea/air) and rapid tactical (helicopter) movement. The first Marine Corps LAV Company was activated in July 1983, the first battalion on 1 April of this year.

The Marine Corps interest in a LAV capability was reflected as far back as 1973. During late 1979, as an outgrowth of the Iranian rescue effort, congressional hearings addressed the need for a rapid deployment force. This force would incorporate lightweight, strategically deployable weapons systems to enhance tactical mobility and firepower in the objective area.

In March 1980, funds were programmed for light armored vehicles to enhance firepower and mobility of the ground forces. As a result of these actions, the Marine Corps embarked on an acquisition strategy to select and procure an off-the-shelf LAV.

The Deputy Secretary of Defense forwarded a memorandum to the Secretaries of the Army and the Navy establishing a joint USA/USMC LAV program. The joint LAV program resulted in a LAV, the LAV-25, being successfully tested and approved for service use by the Marine Corps in July 1982.

During December 1982 the Secretary of Defense certified the LAV program to members of Congress in a letter which, inter alia, addressed the source selection process and the test and evaluation requirements. The letter, which strongly supported the program, stated that the procurement program for FY83–FY87 was affordable, and reaffirmed the urgent need for the LAV capability. This "urgent need" remains valid for the Marine Corps.

While Marine Corps LAV-25's are currently coming off the production line, other mission role vehicles, mortar, communications and control, maintenance and recovery, logistics, and antitank, built from the same baseline design, are being tested to complete the light armored combined arms unit described in Marine Corps testimony to the Congress in 1980. Each of these vehicles will be separately subjected to the approval for service use.

A decision to continue the LAV program unilaterally will cause some temporary turbulence in the existing five year multi-year contract. A plan is underway to preserve the integrity of the original contract quantities. This is being accomplished in part by a revised acquisition strategy to include a LAV battalion for the Marine Corps Reserve in accordance with the Total Force Concept. The strategy will also enhance the strategic capability of the Marine Corps by including LAV's in the MPS program. This plan will enable the Marine Corps to complete the buy of the six mission role variant objective of 758 LAV's in this budget year.

EXPANDING OUR NAVAL FORCES

In order to support the Nation's maritime strategy, there is a compelling need to produce ships, military and civilian, so we may maintain freedom of the seas, provide deterrence at sea, and project that power from the sea should deterrence fail. Equally compelling is our need to enhance strategic mobility and sustainability to ensure that, when force presence is required, we can respond rapidly and with credibility.

Needless to say, we in the Marine Corps strongly endorse the efforts of the Department of the Navy to expand our naval forces, especially those that provide us with a force projection capability—the carrier battle group, the surface action group built around the revitalized *Iowa* Class battleships, and the amphibious ships. These forces represent the essential core for applying maritime power projection in support of the National strategy whether they're in the middle of the Atlantic seeking out and destroying Soviet naval forces that threaten our sea lanes, supporting the land war, security the NATO flanks when they are threatened in maritime areas of providing a flexible strike capability, whether for sea control or projection of power ashore in support of the land.

The Marine Corps views the program for reactivation of the four *Iowa* Class battleships as vital to our force projection capability. Not only will these mighty ships serve as the nucleus of the surface action group but, of critical import to the Marine Corps, all four are necessary to provide naval surface fire support to the assault echelons of a MAF (three battleships) and a MAB (one battleship). As I stated earlier, simultaneous lift of a MAF(AE) and MAB(AE) is the stated DOD mid-term amphibious lift objective. In addition, reactivating the four battleships will allow for two in both the Atlantic and the Pacific Fleets, ensuring greater scheduling flexibility, i.e., overhaul peridos, etc.

Earlier in my statement I discussed the DON Lift Study. The DON has translated the results of this study into a balanced, coordinated approach to building amphibious ships. As General Kelley said in his Posture Statement: "The gloomy predictions of years past, projecting massive block obsolescence of lift assets, have been replaced with not only solid programs but with hard steel on the building ways."

Last June saw the launch of USS *Whidbey Island*, LSD–41, the first amphibious ship to be started in five years and the first to be funded in ten. This June will see the launch of the USS *Germantown*, LSD–42. LSD–43 is scheduled for launch in 1985. One more LSD–41 Class ship has been authorized with plans for two more in this year's defense appropriations and an additional two ships in FY86. The LSD–41 will provide well deck space and have a maintenance capability for both conventional displacement landing craft and LCAC. A follow-on ship class, conceptualized as being based on the LSD–41 hull, but optimized for cargo lift, is being studied by the Navy.

The Amphibious Assault Ship (multipurose) LHD–1 program is vital to the support of current and developing amphibious warfare concepts through the year 2030. As a multipurpose ship class, LHD–1 has a primary amphibious assault role and a secondary mission of force projection and sea control. The LHD–1 Class is a modification of highly successful LHA–1 design. Changes from the LHA will emphasize increased capability to carry three LCACs and 42 (CH-46 equivalent) helicopters. Only through the introduction and continued funding of this highly capable modern ship can we achieve our lift goals of a MAF(AE) plus MAB(AE) by 1994. Funding for the first ship has been included in the FY84 budget. Keel laying for LHD-1, USS *Wasp*, is scheduled for August 1985. A total of five LHD-1 Class ships will be required to meet the 1994 lift goal and five more will eventually be required to replace the LPH-2 Class in the late 1990's.

In addition to these critical new construction programs, the Navy has programmed a SLEP for the 11 ships of our present LPD-4 Class. When "slepped" these ships will contribute 15 years of continued fleet usefulness toward meeting our lift requirements through the 1990's.

STRATEGIC MOBILITY ENHANCEMENTS

Amphibious shipping is clearly the preferred means of providing strategic mobility for the Marine Corps. Nonetheless. fiscal realities place limitations on this asset and dictate that maximum use also be made of other mobility means such as strategic sealift and airlift, and enhancements such as land and maritime pre-positioning to augment and supplement this primary resource. It is a combination of all these which provides the necessary strategic mobility for Marine Corps forces and it is this combination which I would like to address in the closing portions of my statement.

MSC/COMMERCIAL SHIPPING

Earlier I addressed the subject of the Assault Echelon of the MAF and MAB. Now I will address an equally important element the Assault Follow On Echelon or AFOE. The AFOE consists of those troops, equipment, and supplies required to support and sustain the assault. The AFOE is absolutely vital to the successful accomplishment of a MAF or MAB amphibious mission. The ships which must lift the AFOE are commercial ships controlled by Military Sealift Command. They are both government owned and chartered or requisitioned from shipping industry sources. Although the AFOE is currently supportable in dry cargo shipping, we continue to have concerns over the shortage of passenger/troopships. Further, the capability to support the AFOE in dry cargo will be threatened should the U.S. Flag commercial fleet continue its decline.

Because of the importance to the Marine Corps and the National maritime strategy, the U.S. commercial ship capacity must be preserved and increased wherever possible. Those programs and policies which promote a healthy merchant marine and increase the number of government owned ships must be supported in order to retain the viability of amphibious operations.

PRE-POSITIONING PROGRAMS

Complementing our amphibious assault capability is the Maritime Pre-positioning Ships [MPS] Program, a concept which will become a reality later this year. A mobility enchancement initiative, MPS will offer a particularly attractive option in today's international environment. MPS is designed for employment in a preemptive fashion, in situations where forcible entry may be neither required nor desired. In addition, MPS will also be capable of providing rapid reinforcement to previously committed amphibious forces. When the last of three squadrons becomes operational in 1986, MPS will afford our Nation a rapid response, global capability with a credible force that is distinctly naval in character.

MPS will replace the Marine Corps contingent in the Near Term Pre-positioning Force [NTPF], currently stationed in the Indian Ocean. MPS offers significant improvements over the NTPF. It will utilize ships, referred to as TAKX, which have been specifically built or converted to support program requirements. Capabilities of these ships will include Roll on/Roll off, spread loading, selective offload, temperature/humidity controlled spaces, integrated equipment maintenance spaces, and redundant command, control, and secure communications. In addition, MPS will employ a maintenance concept which will reduce the amount of ship-off-station time currently experienced with the NTPF. Most important, however, will be the capability of the MPS for in-stream off-load, thereby eliminating the requirement for port facilities and vastly increasing the number of locations in the world where the concept can be employed.

Ten of an eventual thirteen TAKX vessels are currently undergoing construction or conversion. The first is scheduled for delivery this August. The ships will be assigned to three 4 or 5 ship squadrons. Each squadron will contain 30 days of prepositioned supplies and equipment capable of supporting a Marine Amphibious Brigade. In the event that MPS is committed, the ships would move to the designated point and commence offload. Troops would be airlifted in for subsequent marry-up with the supplies and equipment. Our objective is to achieve a combat capable force in ten days or less. Intermediate maintenance support for the aviation combat element of the Marine Air Ground Task Force (MAGTF) would be provided by an aviation logistic support ship (TAVB), two of which are programmed for delivery in fiscal year 1986.

NORWAY PRE-POSITIONING

Land pre-positioning in Norway facilitates the rapid reinforcement of the critical northern flank of NATO and provides 30 days sustainability by pre-positioning selected equipment and supplies for a Marine Amphibious Brigade [MAB] of approximately 13,000 Marines and over 150 aircraft.

A DOD directed strategic mobility enhancement initiative, this is the Marine Corps' only land pre-positioning project and is based upon a bilateral agreement, the Memorandum of Understanding, signed by the United States and Norway in January of 1981.

The program involves the pre-positioning of selected, additive equipment and 30 days of supply in Norway. Specifically identified for Marine Corps pre-positioning are low maintenance, high consumption ground munitions, subsistence items, selected principal emd items [PEI], construction and barrier material, selected medical supplies, and requisite repair parts.

Host nation support from Norway is significant in several areas. For instance, approximately 370 vehicles (trucks, ambulances, refuelers, oversnow vehicles and engineer equipment) are provided by Norway which reduces the U.S. requirement to pre-position that like amount. Further, Norway provides the maintenance and security for the pre-positioned equipment as well as the redeployment means from the storage sites to areas of likely employment.

A bilateral storage agreement was signed in October 1982, and initial deliveries of equipment and supplies commenced in November 1982 (2,550 short tons of ground ammunition). Additional deliveries were completed during calendar year 1983, including 80 pieces of aviation ground support equipment, 57 M923 5-ton trucks, and 24 M198 howitzers. Announced plans for delivery in 1984 include heavy engineer equipment and aviation ground support equipment.

Pre-positioning in Norway expands the strategic options available to the National Command Authorities for the rapid reinforcement of NATO. The program, when completed, will provide a credible, sustainable force capable of executing current plans with minimal reliance on existing strategic airlift. The program reduces force closure time from weeks to days.

OTHER STRATEGIC MOBILITY ENHANCEMENTS

Our overall strategic mobility enhancement programs are continuing to improve in all areas. As for strategic air assets, the Air Force is making great strides in meeting the million ton miles per day requirement established in the Congressionally Mandated Mobility Study. The 50 additional C-5's are helping in the short term lift requirements. The development and procurement of the C-17 will provide an enhanced lift capability well into the 21st Century. The C-17 will add a great deal of flexibility to the Nation's ability to respond quickly to any part of the world. The C-17 will carry the same oversized and outsized cargo as the C-5, and will land on a C-130 capable airfield. It will carry approximately twice as much cargo as a C-141. For example, in the Grenada operation, the same supplies and equipment could have been delivered almost six times as fast.

There are a number of programs in progress to improve our sealift mobility. The goal for the Ready Reserave Force is 77 ships, which will increase both dry cargo and POL capability. The first four conversions of the SL7's are nearing completion. There will be a total of eight of these fast haulers in the inventory. The Sea Shed program will make a break bulk out of a container ship. Unit cargo and equipment can be carried in the Sea Shed and can be offloaded at pierside or by the new Auxiliary Crane Ship [TACS] in stream. The Sea Shed combined with the TACS greatly enhances our strategic mobility.

Mr. Chairman, that concludes my statement. I am prepared to entertain your questions.

FLEET READINESS

Senator **Cohen**. Let me just interrupt the flow of the testimony a moment. There have been reports, for example, that our forces are less ready today than they ought to be. One of the reasons alleged for that is that we have put so much into the shipbuilding, which you gentlemen have just praised so much, that we have less readiness as a result.

What is your response to that?

General **Glasgow**. This does not refer to the Marine units, sir. Our readiness is higher today than it has been since 1954, sir.

Senator **Cohen**. Well, Marines and Navy. Admiral Walters?

Admiral **Walters**. I will answer that for the Navy. Our readiness is higher today than it has been at any time in recent years, and generally I think our readiness and morale at sea is better than I have seen it in my career.

There are differences between readiness and sustainability, and I think some people tend to confuse that. Our fleet readiness today is excellent. The readiness of my ships, for example, in the surface Navy is up about 19 percent. The readiness of aircraft squadrons is up significantly. The readiness of our submarines is up—that is, more of our forces are deployed in a status where they are ready to fight. More of them are operating in a training status ready to go to the next part of their deployment.

Sustainability. I think we have long made it clear that there are still things in ordnance and things of that nature that we need. So there may be some confusion between sustainability and readiness, but readiness to fight today, I do not think it has been better.

U.S. BATTLESHIPS

Senator **Cohen**. General, you also mentioned the battleships. There has been some criticism about the "ineffectiveness," alleged ineffectiveness, of the battleship in Lebanon—that it was not accurate; that it did not have precision in terms of its targeting; that there was some reluctance even to use the big guns, and therefore the military used aircraft which we ended up losing during one of the bombing missions.

Tell me more about it. Since I have to defend the battleships, and am willing to do so, I would like to go armed with ammunition to answer these critics.

General **Glasgow**. Let me defer it to Admiral Walters.

Admiral **Walters**. I think the first thing that we have to understand about naval gunfire is that there are prescribed procedures for the use of naval gunfire. Generally, if you are going to take on point targets with great accuracy we have consistently, over all the years that naval gunfire has existed, used spotters to spot the rounds.

To understand, the naval gun is accurate, but there are two parts to the problem in which inaccuracies occur. One is how well the target is located; the other is the navigation of the ship. So it is not a question of the accuracy of the guns; it is the accuracy of the system.

In the case that a battleship was employed or that naval gunfire support in general was employed in Lebanon, some had targets that were very accurately located and in fact those targets were hit and destroyed. In other areas, targets had been located within areas and what is commonly referred to as a grid square of so many yards on a side was given to the ships to fire at, including the battleship. All of the rounds fired were delivered within the prescribed area that was requested.

The real factor in determining effectiveness of naval gunfire is that in each case we took on a target. The firing from the area which we intended to suppress stopped and in many cases did not reoccur for several days. So we have no question about the accuracy of the naval gun when it is employed the way it should be.

Senator **Cohen**. Well, the other complicating factor was that you also had an enemy lodged in the middle of civilian areas.

Admiral **Walters**. That is the biggest problem of employing naval gunfire in a situation such as you have in Lebanon where there are friendly and enemy forces intermixed and in which you are very concerned about collateral damage. Many weapons of war, certainly including naval gunfire, have generally been utilized in areas in which there is a very fine line between friendly troops and enemy troops and collateral damage is not the issue because you are going to take the objective.

Collateral damage in a place like Lebanon or civilian casualties are very much a part of the political problem that you have in dealing with those kinds of situations.

Senator **Cohen**. General Mahaffey?

STATEMENT OF LT. GEN. FRED K. MAHAFFEY, DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS, U.S. ARMY

General **Mahaffey**. Mr. Chairman, I would also ask that my prepared statement be entered into the record.

You know, the Army is the principal user of airlift and in that sense considers it to be a vital element of our national strategy. In fact, either in a deterrent or preemptive or warfighting sense our future success as a force may well depend upon the rapid—and I underscore that word—delivery of a balanced force into the crisis area.

Airlift is the cornerstone of Army force projection during the early days of deployment. It provides a rapid and selective means for buildup of combat power over a wide variety of conditions. In many areas of the world airlift is the only means useful for the early introduction of Army Forces.

In short, the Army depends upon airlift to deploy and sustain units until sealift takes effect, which may range from about 15 to 20 days after mobilization begins in the case of the European scenario, to 30 or 40 days in a non-NATO scenario.

We believe that the Army's new light division initiative will strengthen our ability to execute existing war plans and the airlift requirements to deploy the light 10,000-man division will significantly enhance our ability to reduce both the response time and resources against the less risky but more likely low intensity contingency.

The light infantry division will deploy in reponse to several different scenarios and is therefore capable to being tailored with combat support and combat service support assets. I do not anticipate a net reduction in strategic lift requirements as a result of the light division initiative, but, rather, a substantial increase in our force packaging flexibility to respond to a wide range of contingencies. Improving our airlift capability through the C–17 is key, we believe, to optimizing the strategic utility of that light division.

Strategic airlift deploys combat power to the theater during the very early stages of a crisis. Intratheater airlift permits the forward deployment of the same fighting units and their equipment into the forward reaches of the battle area. It is a vital complement to the strategic airlift and sealift. In many remote areas of the world, particularly in Southwest Asia, arriving forces must be moved great distances before they can be employed in battle. Road and rail nets in these areas are poor or nonexistent. Intratheater airlift often provides the only means to move combat units and equipment away from congested ports and airfields forward to engage the enemy, and since much of the combat equipment in our divisions is outsize, intratheater airlift must also have the capability to carry such cargo. The ability to operate into and out of austere forward airfields is also essential.

In addition, intratheater airlift must have the capability to air drop troops, supplies, and equipment to take full advantage of tactical opportunities or to perform emergency support and resupply missions.

The Army expects the C–17 to dramatically improve our intratheater strategic deployment capability as well as the projection of forces and sustainment into the small, austere forward areas such as those found in our combat brigade areas.

While airlift is the most critical mobility asset during the early stages, the fact remains that sealift is a pivotal component in the timely and rapid projection of the bulk of the Army's combat power into a theater. The Army is the principal wartime user of sealift and considers it also to be an essential element of our national strategy.

SEALIFT ESSENTIALITY TO ARMY FORCES

Senator **Cohen**. Would 95 percent of all the requirements be sealift? It would be 95-percent sealift?

General **Mahaffey**. That is about right. Without it, the Army simply cannot meet its global commitments.

The key to strategic sealift is that the right type of shipping must be available in the right quantity, at the right port early enough to ensure that deploying forces meet their required delivery dates in the contingency area. I cannot overemphasize the word "early," if the Army is to really achieve a rapidly deployable military force. Because of the essentiality of sealift to the deployment of Army Forces, we fully support those Navy programs which would enhance that early delivery capability.

In the Army's view, sealift programs must posses rather unique characteristics. In addition to being available early, it is critical that the shipping be capable of rapid loading and discharging and have the speed to meet demanding delivery schedules into the many contingency areas. These features are unique military requirements that are covered only to a limited extent by the commercial sector. The fact is that the total roll-on/roll-off [RO/RO] capability available to deploy U.S. Forces is severely limited. Once converted from container ships to the RO/RO configuration, the eight SL-7's planned for acquisition by the Navy will significantly increase our current capability.

RO/RO SHIPS

Senator **Cohen**. Could you state for the record what the number of RO/RO ships available is in the world today, how many we have in our inventory? I believe it is 500, is it not, that are in existence? I am sorry, we have 25, 8 of which are in the Military Sealift Command. Is that right?

General **Mahaffey**. Mr. Chairman, I will ask the Navy to respond to that.

Admiral **Avrit**. The RO/RO ships that exist commercially target themselves toward the commercial automobile roll, so the fact that they are a RO/RO ship does not necessarily make them militarily useful to us. Besides the SL-7 conversions, we have several U.S.-flag RO/RO ships operating in support of various military exercises, but generally speaking there is not a direct transfer of a worldwide RO/RO fleet to our military needs. They would have to go through a conversion.

General **Mahaffey**. The specific RO/RO's that I was referring to, of course, were those which travel at a speed of about 33 knots, of which the Navy plans to acquire eight, and with that acquisition they would have the ability to move simultaneously one of our heavy divisions, either mechanized or armored plus some of its support to a contingency area such as the Persian Gulf within about 14 or 15 days. The completion of that SL-7 conversion program is, therefore, of vital importance to the Army's force projection capability.

The Navy, in coordination with the Army, is also developing the means to harness the potential of the container ship fleet. The Navy Flatrack and Seashed programs should do just that. The modified container ship represents an enhancement to our sealift capability through integration of militarily useful features on vessels that would otherwise have only limited value to the early deployment of Army Forces. Unfortunately, even with the eight converted SL-7 RO/RO ships, the strategic sealift available to deploy a combat-effective and balanced force that meets the Army's rapid deployment contingency requirements remains inadequate.

Another integral part of the strategic mobility equation, in our view, is the ability of the Army and the Navy to receive and discharge shipping once it arrives in the objective area. With the inception of the U.S. Central Command, we recognized that potential objective areas to which forces might be deployed lack well-developed port facilities, and the movement of equipment and supplies would have to be accomplished through austere or even damaged ports, or over the beach. To meet this need the Army has pursued an aggressive program to modernize and develop its water craft and terminal service capability.

In summary, Mr. Chairman, permit me to emphasize again that your continued support of the strategic mobility program is vital in permitting the Army, Navy, and Air Force to increase the capability to meet our deployment objectives.

[The prepared statement of General Mahaffey follows:]

PREPARED STATEMENT OF LT. GEN. FRED K. MAHAFFEY, DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS, DEPARTMENT OF THE ARMY

Mr. Chairman and members of the committee, I am pleased to be here today and have the opportunity to present the Army's views on strategic mobility. The Army is the principal user of airlift and considers it an important element of our national strategy. In fact, either in a deterrent or preemptive sense our future success may depend upon the rapid delivery of a balanced force to the crisis area.

Airlift is the cornerstone of force projection during the early days of deployment. It provides a rapid and selective buildup of combat power over a wide variety of conditions. In many areas of the world, airlift is the only means useable for the early introduction of Army Forces. In any non-NATO contingency, the requirement to secure airfields, lines of communication, and conduct offensive or defensive operations will principally be satisfied by troops delivered by airlift. The Army depends upon airlift to deploy and sustain units until sealift takes effect which may range from about 15–20 days in Europe to 30–40 days in a non-NATO contingency. Airlift is absolutely essential to the rapid transport of critical supplies, replacements, and forward deployment of major combat units in the area of operations.

In the Army view, airlift must be designed with features that enhance mobility. Equipment must be easily loaded and offloaded without special ground support equipment that may not be available in the combat zone. A drive-on and drive-off capability is essential to enable weapons systems to be loaded in a ready to fight or operational configuration. These features are unique military requirements; they are not found in commercial aircraft.

Today, we are seeking ways to reduce the profile of some equipment in the design phase, because we lack sufficient outsize airlift to transport it in driveaway or flyaway condition. However, we clearly do not want to disassemble equipment for airloading. The concern is not the effort or time such disassembly requires in the United States but rather the cumulative effect of time consuming reassembly in the confusion and uncertainty of a war zone where airfield congestion creates lucrative targets and where early employment of units may provide a margin for success. The need for special tools, equipment, and skills necessary for reassembly only adds to the airlift burden during the crucial early days. In addition, reassembly often includes the requirement to test-fly aircraft, realign weapons systems, and test fire.

Unit cohesiveness is also critical to deployment strategy. Some interruption in intertheater movement of units is unavoidable. However, excessive fragmentation of units and their equipment can result in loss of control in the war zone where the emphasis must be on rapid organization for combat. The Army's airlift needs are varied and to a large extent threat dependent. For example, we can expect our heaviest forces to be committed very early in Europe while lighter, more mobile units may be deployed early to some areas of Southwest Asia. Follow-on deployments to both theaters would be a mix of heavy and light forces. All such contingency scenarios require the employment of a balanced force with its associated bulk, oversize, and outsize cargo.

The amount of outsize equipment in today's Army divisions is substantial. For example, approximately 44 percent of an armored division's equipment is outsize, while the merchanized division has 41 percent. The Airborne Division is currently the Army's lightest with an outsize requirement of four percent. While the ground commander does not normally require all of this equipment immediately, there are some outsize items which are critical to combat and which must be delivered early. These include firepower and mobility—tanks, 155mm and eight-inch self-propelled artillery, and support helicopters. Moreover, the outlook for the near-term is for an overall increase in outsize tonnage for Army units.

We are well aware of the impact increased weight has on mobility and are even now evaluating the efficiency of lighter forces equipped with advanced technology. The Army's new light division initiative will strengthen our ability to execute existing war plans. The airlift requirements to deploy the light, 10k man division will significantly enhance our ability to reduce the response time and resources against the less risky but more likely low intensity contingencies. The Light Infantry Division will deploy in response to several scenarios and is therefore capable of being tailored with a corps force of engineer, air defense, aviation, and other combat support and combat service support assets. I do not anticipate a net reduction in strategic lift requirements as a result of the light division initiatives, but rather a substantial increase in our force packaging flexibility to respond to a wide range of contingencies. Improving our airlift capability, thru the C-17, is key to optimizing the strategic utility of the light infantry division.

Closure times in the various scenarios point to a significant outsize shortage that cannot be satisfied by the existing fleet. The threat will dictate the sequence that units and equipment will be airlifted. The need for a balanced force will result in a wide distribution of bulk, over and outsize cargo throughout the deployment. To do otherwise would destroy unit integrity and very likely result in an operation that is tactically unsound.

Strategic airlift deploys combat power to the theater during the early stages of a crisis. Intratheater airlift permits the forward deployment of these fighting units and their equipment to the battle area. It is a vital complement to strategic airlift and sealift. In many remote areas of the world, particularly Southwest Asia, arriving forces must be moved great distances before they can be employed in battle. Road and rail nets in these areas are poor or non-existent. Intratheater airlift often provides the only means to move combat units and equipment away from congested ports and airfields forward to engage the enemy. Intratheater movement also is frequently conducted under conditions where combat is imminent. Troops and equipment must flow together: unit integrity and speed are essential. Combat power must not be fragmented because to do so would risk defeat. Since much of the combat equipment is outsize, intratheater airlift must also have this capability. The ability to operate into and out of austere, forward airfields is also necessary. In addition, intratheater aircraft must have the capability to airdrop troops, supplies and equipment to take full advantage of tactical opportunities or to perform emergency support and resupply missions.

The Air Force C-17 acquisition program makes significant improvements in the Army's ability to meet its inter and intratheater airlift requirements across the full spectrum of warfare. The Army expects the C-17 to dramatically improve our intertheater, strategic deployment capability as well as the forward areas such as those found in our combat rear areas.

While airlift is the most critical mobility asset during the very earliest stages of a conflict, the fact remains that sealift is the pivotal component in the timely and rapid projection of the bulk of the Army's combat power into the theater. The Army, as the principal wartime user of sealift, considers it an important element of our national strategy. Without adequate sealift, the Army cannot meet its global commitments. The Army simply does not have enough combat forces to satisfy all possible worldwide contingencies and, therefore, depends upon the rapid delivery of U.S. forces to a crisis area. For this reason strategic sealift is inherently linked to the Army's strategic utility and combat effectiveness; for only sealift provides the capability to project sufficient heavy combat power, representing both a credible deterrent and warfighting force.

I want to emphasize that the Army is dependent upon the Navy to provide adequate, responsive sealift to meet our critical early deployment objectives. Once forces are ashore, strategic sealift carries the lion's share of cargo and supplies essential to their sustainment. Shipping begins to arrive in 15 to 20 days to Europe, and may take as long as 30 to 40 days to a non-NATO area, such as the Persian Gulf. While the Army must initially rely upon airlift during the earliest stages of a deployment, once the sea lines of communication are established, sealift will move more than 90 percent of the equipment and supplies into the objective area. We are, therefore, vitally interested in the health, viability and composition of both Government controlled shipping and the U.S. merchant marine fleet which provides a substantial portion of the intertheater sealift capability.

The military key to strategic sealift is that the right type of shipping be available in the right quantity, at the right port, early enough to ensure that deploying forces meet their required delivery dates in a contingency area. I cannot over-emphasize the word "early", if the Army is to really achieve a rapidly deployable military force. Because of the vital nature of sealift to the deployment of Army forces, we fully support those Navy programs which enhance that early capability.

In the Army's view, sealift programs must possess unique characteristics. In addition to being available for early loading, it is critical that shipping be capable of rapid loading and discharging, and have the speed to meet demanding delivery schedules into the contingency area. Given the mechanization of modern forces, roll-on/roll-off [RO/RO] capability is essential to enable Army weapons systems to be offloaded in an operational configuration at the far side. These features are unique military requirements, shared only to a very limited extent by the commercial sector. The fact is that the total RO/RO capability available to deploy U.S. forces is severly limited. Of the more than 500 RO/RO vessels operating in the free world, the U.S. only has 25; eight of which are in the military sealift command [MSC] fleet, and three in the National Defense Reserve Fleet [NDRF]. Once converted, from containerships to RO/RO ships the eight TAKR's [SL-7's] will significantly increase the current RO/RO capability. Due to their size and speed, converted SL-7's will provide the capability to move a heavy division plus some of its support simultaneously to a distant contingency area such as the Persian Gulf within 14 to 16 days. The completion of the SL-7 conversion program is of vital importance to the Army, since it will provide a tremendous increase to our fast sealift capability.

The Navy's program to increase the Ready Reserve Force [RRF] from its current 31 ship configuration to 77 by 1988 will also enhance the Army's ability to deploy earlier. The expanded RRF will provide a pool of ships maintained in readiness state to meet early deploying forces as they move to their seaports of embarkation. But, this quick response subset of the National Defense Reserve Fleet [NDRF] is not the whole answer in satisfying the sealift deployment requirement.

The Navy, in coordination with the Army, is also developing the means to harness the potential of the container ship fleet. The Navy flatrack and seashed programs should do just that. The modified container ship represents an enhancement to our sealift capability by integrating militarily useful features into vessels that would otherwise have limited value to the early deployment of forces.

Unfortunately, even with the eight converted SL-7 RO/RO ships, and enhancements I have enumerated, the strategic sealift available to deploy a combat effective and balanced force that meets the Army's rapid deployment contingency requirements remains inadequate. As recommended in the congressionally mandated mobility study, the minimum requirement for additional sealift is 100,000 tons.

Another integral part of the strategic mobility equation is the capability of the Army and Navy to receive and discharge shipping once it arrives in an objective area. During the 1970's this function was largely ignored and as a result suffered. But, with the inception of the U.S. central command, it was recognized that potential objective areas to which forces might be deployed lacked well-developed port facilities and the movement of equipment and supplies would have to be accomplished through austere or damaged ports or over the beach. The Army has been assigned the mission of discharging deploying forces and sustaining shipping, but also to be prepared for port and logistic-over-the-shore [LOTS] operations incident to joint operations. To meet this need, the Army has pursued an aggressive program to modernize and develop its watercraft and terminal service capability. The five-year Army program will provide the lighterage, container handling equipment, and air cushion vehicles necessary to meet Army port and LOTS operational requirements. Current Army capability can satisfy approximately 50 percent of the total LOTS requirement with the fielding of two air cushion vehicle [LACV-30] companies and the acquisition of commercial landing craft and causeway systems. By fiscal year 1987, the Army will be able to totally meet the requirement. Each of these programs is designed to contribute to the Army's LOTS capability. As part of the Army watercraft master plan selected vessels will have a self-deliverable capability. This will reduce some of the strategic sealift shortfall by eliminating the need to move the heavy, outsized lighterage required in theater early in the deployment sequence. Much of this effort is a result of a memorandum of agreement that provides for a coordinated Army-Navy programming effort. The objective of the Amy-Navy effort is to identify, develop and acquire the equipment needed to satsify the total DOD offload requirement at the most affordable cost.

Prepositioning continues to be a crucial part of our balanced strategic mobility capability. In fact, the recognized shortage of strategic lift assets, particularly airlift, has increased its relative importance as a means of force projection. Our planned and existing prepositioning programs, in conjunction with our airlift forces, will improve our capability to deploy combat forces rapidly to distant conflict regions.

In conclusion, your continued support of strategic mobility programs is essential and will permit the Air Force and Navy to increase their capabilities to meet DOD deployment objectives. Such improvements are necessary if the Army is to retain its credibility as a viable deterrent and war fighting force.

Senator COHEN. General, thank you very much. I would reiterate that your full statements will be included in the record. They are very good statements. They give us the kind of detail that is important.

Before calling on each of you to respond to some questions, Senator Nunn, would you care to make any opening remarks?

Senator **Nunn**. No, thank you, Mr. Chairman. I will just wait for questions.

C-17 AIRLIFT PROGRAM

Senator **Cohen**. General Ryan, the Air Force now wants to enter full-scale engineering and development of the C-17 airlift program during fiscal year 1985. Could you tell me what the significance would be entering full-scale engineering and development and the consequences if Congress in its wisdom decided not to fund it?

General **Ryan**. If Congress decided not to do that?

Senator **Cohen**. In other words, if there is a major reduction even beyond that which the President has agreed to, and if the C-17 is the one of the items that the Congress considers reducing, what is the impact of cutting the funding for full-scale development in fiscal year 1985?

General **Ryan**. Assuming that the full-scale engineering and development must be picked up in a subsequent year, of course, a slip would be entailed. It is difficult to characterize the dimensions of that slip in that the contractor, McDonnell-Douglas in this instance, has made a significant investment in its engineering effort and staff, and because of the extended R&D program that has occurred on the aircraft it is very far along indeed for an aircraft at this point in its development.

Nonetheless, I think the immediate impact would be some difficulty in keeping that engineering staff together and at least a slip of a year in IOC of the aircraft, which in turn would exacerbate the inability to meet the goals of the congressionally mandated mobility study in terms of strategic airlift and would continue to avoid improving the intratheater direct delivery capability.

Senator **Cohen**. The Air Force has requested $129.3 million for fiscal year 1985 for the C-17 R&D program. Again, what impact would the elimination of these funds have upon that program?

General **Ryan**. Those funds are critical to the start of full-scale engineering development. The $26 million that was appropriated in 1984 will be expended shortly after the end of this fiscal year and continued funding is essential in order for that program to move forward.

C-5 AIRLIFT AIRCRAFT

Senator **Cohen**. I am sure Senator Nunn is going to want to pursue some of these questions on the C-17, but the Lockheed Corp. believes that the C-5 airlift aircraft has not been fully tested and that its full capabilities have not been realized.

I would like to have your views for the record as to what you believe are the needs for additional testing of the C-5.

General **Ryan**. I do not believe there are any requirements for additional testing. We are in receipt of an unsolicited proposal from Lockheed to offer to demonstrate certain capabilities which we have a mixed reaction to.

There are six basic items in that list. Three of them we are willing to stipulate as being capabilities that already exit in the aircraft based on the early testing that we conducted in 1970 and 1971, and also our 14 years of operational experience with the aircraft. We feel we know the airplane pretty well.

One of the suggested maneuvers that they would have us demonstrate we believe would be an unsafe maneuver. It would put the aircraft at risk unnecessarily and risk damage to it. There are two others, one involving backing the aircraft. We have severe reservations about being able to back the aircraft not only from the standpoint of using the thrust reverser system for that purpose. It was not designed for that, nor was the aircraft designed to be backed. But, in addition, to be able to steer the aircraft when proceeding to the aft, due to the design of the 28 landing gear trucks out there. They are designed to caster in normal taxiing operations and we do not understand how we would do that in reverse.

Nevertheless, we have responded to Lockheed in that regard and said that if they are in possession of some increased technical assurances that that could be done and that they would hold the Air Force harmless and repair any damage that might be incurred, we would be happy to look at it.

The final area had to do with increasing the allowable gross weight of the aircraft rather significantly. Right now it is limited at takeoff to 769,000 pounds. They would propose to increase that to 837,000 and further to allow an in-flight gross weight to go up to 920,000 pounds. We have some very grave concerns about that sort of thing. It is an undemonstrated capability. It technically is the structural limit of the airplane.

In our view, take off and landing at those weights would exceed the brake energy limits that have been set down for the aircraft. It would restrict it to a significantly lower service ceiling at around 21,500 feet, for example, which is a very uneconomical altitude at which to operate.

And, finally, takeoffs at those weights would require runways that exceed the runway lengths that are available. Critical field lengths, for example, would be in the neighborhood of 13,000 to 15,000 feet, and outside of Edwards Air Force Base out in the desert and perhaps Eileson in Alaska there are no fields that long.

C-17 LANDING CAPABILITY

Senator **Cohen**. Is the C-17 capable of landing on strips of 3,000 feet? Is that what I have read?

General **Ryan**. Yes, sir, Mr. Chairman; the C-17 will have that capability. For comparison purposes, however, in certain circumstances the C-5 can also land on 3,000-foot strips. Landing at those fields, however, is not the whole story. Typically, airfields 3,000 feet long do not have, for example, 150-foot hammerheads at the end to allow a large aircraft like the C-5 to turn around, and they also typically have relatively narrow taxiways without fillets that would permit the C-5 to exit the runway.

And so in a very large number of cases you end up with a static display at the end of the runway as there is no way to move the C-5 around.

Now it is true that the C-5 will operate on unprepared surfaces, to the extent that you know the consistency of those unprepared surfaces—you know how hard they are, in other words. And the variances in soil surrounding runways and taxiways on a worldwide basis is not very well known.

They vary. They vary with the weather. They vary with how well they were constructed and the material that they are composed of. And so we do not consider that a routine means of maneuvering the aircraft.

Senator **Cohen**. One of the major arguments for the building of a C-17 is that you need to get close to the lines of battle. You keep mentioning the word "austere" in describing airfields located all around the globe.

One of the counterarguments that is being raised against that is that it is foolhardy to try and land something as big or as expensive as the C-17 so close to the battle line. It would be subject to being shot down by some guerrilla forces that might be armed with SA-7, vice 5 or something else. It could be taken out with a shoulder-held missile.

What is your response to that? It seems very attractive to say you want to land the aircraft close to where you have got to fight the battle. You want to make sure you can get them off in one piece so you do not have to assemble, disassemble, lose time, endure congestion, backup, confusion, and get that equipment out to where you need it to fight the battle.

But the counterargument that I have heard being raised is that it is simply not sound practice to put that kind of aircraft that close to where the battle is going to be fought, because they will never arrive. What is your response to that?

General **Ryan**. Is is an interesting point, Mr. Chairman, and certainly a concern, I think very significant. The C-17 has been designed for survivability in that arena, to the extent that my airlift pilots would far prefer to take a C-17 into a forward airfield in a hostile environment than any other airlift aircraft they have encountered to date.

Now why is it survivable? It, first of all, has redundancy of systems. The aircraft does not rely on a single hydraulic system, for example, but has in fact four of those systems. That kind of redundancy pervades the aircraft in all its major support systems. Those components are spread throughout the airplane so that if it does get hit it does not necessarily take out the whole aircraft.

It has a very significant improvement in its ability to get into and out of airfields very rapidly. For example, it can cruise as high as 410 knots, but its normal low-altitude cruise is only about 350 knots. It can slow down very, very rapidly inside of 2 minutes and descend very steeply in a manner that a normal aircraft cannot do. It is designed for a very steep glide path on final approach, 5 degrees—3 degrees is normal. It is designed for an impact type landing.

The pilot has a heads-up display to allow him to plant the aircraft on the end of the runway and powered lift devices, which are a big technological improvement on the aircraft, allow it to do all this at a fairly slow speed on final, so it accommodates a short airfield.

Once on the ground, its directed flow thrust reverser system allows it to maneuver almost like an aircraft half its size. It can in fact operate on airfields that are normally restricted to the C–130, a much smaller aircraft. It has the same capability in exiting. It can get back up to 10,000 feet in a little less than 3 minutes, as soon as it has discharged its load, with enough fuel to get to an ultimate destination.

Its capability relative to the C–130 is about four times. In other words, it can carry about four times as much cargo into the same airfield. Its crew consists of three people; the crew of a C–130 is five. If you do that arithmetic you end up with about a 7-to-1 risk ratio as far as exposing human life to harm's way.

So we believe the aircraft is very survivable and we fully intend to deploy it just as we have advertised, close to the combat area, to direct delivery of those forces to where they are needed.

Senator COHEN. Senator Nunn?

Senator NUNN. Thank you, Mr. Chairman.

INTERTHEATER AIRLIFT

General Ryan, the 66 million ton miles per day requirement for intertheater airlift, is that still the correct goal? Is that the number you use?

General RYAN. Yes, sir, it is.

Senator NUNN. What year was that established?

General RYAN. It was established in 1981, sir, in the congressionally mandated mobility study which was something that this committee directed.

Senator NUNN. Do we have a counterpart intratheater requirement?

General RYAN. We do not as yet, Senator. The same congressionally mandated mobility study referred to the difficulty in quantifying intrathreater delivery requirements. It called for a significant increase in delivery requirements without assigning a number to it. OSD, specifically programs analysis and evaluation, is nearing completion—I say "nearing," September of this year is the estimate—on a study called WIMS, which is the worldwide intratheater mobility study.

Senator NUNN. When will that be ready?

General RYAN. Early this fall, sir. I have had a preliminary briefing on it and in my view they are doing an excellent job. It is a very exhaustive look.

Senator NUNN. Could you address the question of whether we are grossly underfunded in terms of that capability now?

General RYAN. I think we are, sir, and my fellow commanders, unified, and specified commanders, share that concern. The initiatives that we have undertaken—and we have been discussing them this morning—prepositioning of material in various theaters, Europe and Southwest Asia, the fast sealift and the emphasis on intertheater airlift—has tended to concentrate large amounts of equipment and cargo in a contingency at a few major points and little or nothing has been done to increase or enhance our ability to move that forward to where it is requried.

Senator NUNN. That 66 million ton miles per day, is that based on a single NATO contingency, or is that a multiple contingency scenario?

General **Ryan**. It was neither, sir. The CMMS working group looked at four scenarios, basically—a European scenario, a Southwest Asia scenario, and then a variation on those two where one transitioned into the other—and they concluded that the requirements for airlift, intertheater airlift, were greater than could reasonably be expected to be produced in the next several years in any of those scenarios, so they finally settled on a figure that was 20 million ton miles greater than the fiscal 1986 expected capability.

Of course, the reason that we picked the fiscal 1989 delivered capability in the airlift master plan is that is the year that the C-5B procurement will be completed, KC-10's will be complete, and we will have completed the CRAF enhancement program as well as filled up our spare parts bins on the C-141 and C-5. And so we looked out and realized the limit of our current force structure.

Senator **Nunn**. Did that intertheater study that we referred to on the 66 million ton miles per day requirement, take into account the air-land battle concept that is now being talked about and beginning to be implemented? Do you know whether that envisioned that?

General **Ryan**. The congressionally mandated mobility study did not. However, our work with the Army, particularly in the revalidation report required by last year's authorization committee on the C-17, did in fact take into consideration the air-land battle strategy and it well addresses that requirement.

ARMY LIGHT INFANTRY

Senator **Nunn**. Did you take into account, on either the revalidation or the original study, the light infantry concept the Army is moving to or was that a fresh concept?

General **Ryan**. Yes, sir, we did, on the latter study, and we have since looked at it very closely. General Mahaffey mentioned in his opening remarks the fact that the C-17 would work to enhance the light infantry division concept.

That will consist, as you probably know, of 3 out of 17 proposed divisions and while those divisions will have great mobility in terms of long distances with very few numbers of aircraft, 478 C-141 or a few number of C-17 sorties, it does rely to a greater extent on intrathreater mobility once it gets there.

Beyond that, I would yield to General Mahaffey to expand on that.

Senator **Nunn**. Let me come back on that because I have a few more questions and I think we are running out of time. Let me just wrap up that one up by asking if this new intra study is going to take into account both air-land battle and light infantry.

General **Ryan**. Yes, sir, it does, and it does so in a hostile environment.

C-17 PROGRAM COST

Senator **Nunn**. What is your current cost of the C-17 program as you now estimate it?

General **Ryan**. In fiscal year 1984 dollars, the total cost of the program is $24.255 billion.

Senator **Nunn**. Would you repeat that?

General RYAN. $24.255 billion in fiscal 1984 dollars, and that is the total program cost.

Senator NUNN. I keep hearing the number $39 billion. Was that then-year dollars?

General RYAN. Yes, sir. If you escalate the dollars cut to the end of the procurement period, which of course stretches until 1998, inflation over all those years would boost the number.

Senator NUNN. So you constant dollar estimate is about $24 billion?

General RYAN. Yes, sir.

Senator NUNN. And your then-year dollars is $39 billion?

General RYAN. I believe $39.1 billion, sir.

Senator NUNN. What is your constant end-year dollar estimate on the per unit cost?

General RYAN. $100.3 billion, sir. That is the figure.

Senator NUNN. Million you mean?

General RYAN. Yes, $100.3 million.

Senator NUNN. Is that constant dollar?

General RYAN. That is constant fiscal 1984 dollars and that is unit program cost which includes flyaway and R&D. That was the cost that was sent over in the SAR report just a few days ago.

Senator NUNN. How about then-year dollars? In other words, what correlates in unit cost to the $39 billion figure?

General RYAN. $188.4 million.

Senator NUNN. $188.4 million?

General RYAN. Yes, sir. Now that includes aircraft flyaway of $144 million, R&D of $18.7 million, and other system costs which include spare parts and ground support equipment of $25.6 million.

Senator NUNN. What number on the C-5 would correlate to the $100 million constant dollar figure you just gave on the C-17? What is the comparable number on the C-5?

General RYAN. $141 million in fiscal year 1984 dollars.

Senator NUNN. $141 million?

General RYAN. Yes, sir.

Senator NUNN. Do you expect the administration's budget amendment that would be made pursuant to the President's scaling down of the defense budget, to affect either the C-17 budget request or the C-5 budget request?

General RYAN. I do not, if at all only in a very minor way, but not to effect anything like slippage of the program or delay of delivery of the aircraft, either the C-5B or the C-17.

Senator NUNN. You do not expect it will affect either one of them in a significant way?

General RYAN. I do not.

Senator NUNN. Do you think after the budget request is made you are still going to havė schedules on the C-5 and the C-17 that are complementary as far as you are concerned?

General RYAN. I do. The two programs I think are meshed very closely right now. As I am sure you know, the procurement dollars on the C-5B terminate in fiscal year 1988. And so they fit end-to-end very well and the result is a level effort of funding as far as airlift programs are concerned.

C-17 AIRFIELD FORWARD BATTLE CONCEPT

Senator **NUNN**. On Senator Cohen's question about the austere air field forward battle concept on the C-17, what kind of experience do we have in Southeast Asia with landing? What were you using over there—the C-130's mainly?

General **RYAN**. Yes, sir. We had C-130's and C-123's and C-7's.

Senator **NUNN**. C-7's. What was your experience over there in general in terms of landing those aircraft in, let us say, austere fields or forward areas where they would be exposed to guerrilla activity?

General **RYAN**. I think our experience was very good, sir. In general I think it is a truism that you do not commit an airlift aircraft of any sort in a truly hostile environment, although there were exceptions—the reinforcement at Khe San, for example, the marines that were under seige there—not routinely, but we did land C-130's and C-123's, performed engine running combat offloads on the runway, and did a rapid turnaround and takeoff again, and if that is the only game in town, that is the only way to get the equipment and supplies in there.

Senator **NUNN**. My time has expired, but could you furnish for the record on this the number of losses we had with each one of those aircraft during the Vietnam period?

General **RYAN**. Yes, sir.

[The information follows:]

SUMMARY OF SOUTHEAST ASIA (SEA) AIRLIFT OPERATIONS

	C-130	C-123	C-7	Total
Aircraft lost [1]				
Accidents	21	32	12	65
Antiaircraft fire	19	14	7	40
Ground attack	13	4	1	18
Total	53	50	20	[2] 123
Crewmembers lost				229
SEA airlift operations, 1962-73:				
Sorties	742,252	663,992	901,890	2,308,134
Flying hours [3]	632,445	543,036	636,377	1,811,858
Loss rate:				
Per 100,000 sorties	7.140	7.530	2.218	5.329
Per 100,000 flying hours	8.380	9.207	3.143	6.789

[1] The USAF transports lost in Southeast Asia between 1962-1975.

[2] These figures exclude two HC-130's destroyed on the ground in 1968 and three C-130's destroyed by ground fire in North Vietnam and Laos in nonairlift activities before 1969. They also exclude three C-123's and UC-123's lost in Laos in nonairlift activities before 1969.

[3] Flying hours for some months were unavailable making the figures shown slightly lower than actual.

By way of comparison, we lost 52.74 fighter aircraft per 100,000 sorties in South Vietnam, Laos, and Cambodia from 1965 through 1973. The peacetime accident rate for the C-130, C-123, and C-7 between 1976-1983 was .653 aircraft per 100,000 flying hours or about one-tenth the rate during the Vietnam War.

The bottom line is that we put our airlift aircraft at risk in Vietnam and we would do so again, if required. As was discussed previously, the C-17 will be more survivable and will require fewer sorties to accomplish any given airlift objective. Thus, we would anticipate C-17 losses to be considerably less under a similar threat situation. Further, with its complement of only three crewmembers, we would anticipate far fewer crewmember losses in any future conflict.

Senator **NUNN**. Thank you, Mr. Chairman.

Senator COHEN. Thank you very much, Senator. For the record, I am going to include an analysis that was done by the Congressional Budget Office at my request of the desirability, at least, of the C-17 from a fiscal point of view, a funding point of view, showing that the C-17 in the near term and long term is less expensive than the alternatives that have been offered by the Air Force.

[The information follows:]

CONGRESSIONAL BUDGET OFFICE
U.S. CONGRESS
WASHINGTON, D.C. 20515

Rudolph G. Penner
Director

March 27, 1984

MEMORANDUM

FROM: Bob Hale
John Hamre

SUBJ: Preliminary analysis of Costs of Meeting Airlift Requirements

Attached are briefing slides and explanatory notes that comprise preliminary results of an analysis of the costs of meeting future airlift requirements. The analysis is being prepared by the Congressional Budget Office (CBO) at the request of the Sea Power and Force Projection Subcommittee of the Senate Armed Services Committee. These preliminary results are being made available in time for Subcommittee hearings on airlift.

The analysis compares the Air Force plan to buy C-17 aircraft and make other important changes to the U.S. airlift fleet with an alternative that buys C-5 and KC-10 aircraft along with additional C-130 planes. Both the Air Force plan and the alternative eventually meet a goal of delivering 66 million ton-miles per day of cargo. In terms of budget authority expressed in constant dollars, total costs of the alternative are higher relative to the Air Force plan over the next five years (1985-1989), lower over the next 20 years (1985-2004), but then higher again over the next 30 years (1985-2014) as the alternative's higher operating costs become more important. Critics have questioned some details of the Air Force's plan; under differing assumptions about how the Air Force plan could be implemented, the alternative would still cost more over the next five years but could be substantially cheaper over the next 20 years and no more costly over the next 30 years. The attached results also describe important qualitative differences between the alternatives.

Later this year, CBO will publish a full report on meeting lift demands. That report will present more background on U.S. needs and programs and will consider more options, including the option of meeting lift demands by buying more ships rather than more aircraft.

The analysis is being done by Jack Mayer of CBO's National Security and International Affairs Division with cost analysis by Bill Myers of CBO's Budget Analysis Division. If you have questions about these preliminary results, please call Jack at 226-2913.

MEETING FUTURE AIRLIFT REQUIREMENTS:
BRIEFING ON PRELIMINARY ANALYSIS OF
COSTS OF ALTERNATIVE APPROACHES

John D. Mayer Jr.
Principal Analyst
National Security and
International Affairs

William P. Myers
Cost Analyst
Congressional Budget Office

NOTE

All costs are in fiscal year 1985 budget authority dollars. Costs associated with retirement accrual accounting are not included in the cost summaries. Cumulative costs reflect the cumulative changes to the operating and support baseline costs of the 1988 programmed airlift fleet. All specifications regarding operating and support costs were provided by the Air Force.

INTRODUCTION

- Department of Defense 1982 proposal for near term airlift enhancements
- Air Force 1983 plan for future airlift and airlift force structure
- Secretary of Defense 1984 endorsement of the C-17 aircraft and proposed force structure changes

Introduction

The Air Force submitted a Request for Proposal to the aircraft industry in 1980 for a new intertheater airlift aircraft called the C-X. After evaluating the proposals submitted, the Air Force announced the McDonnell-Douglas C-17 as the selection. It became the Air Force position that the shortfall in airlift capability could best be met by procuring a future force mix of KC-10s and C-17s. In spite of this initial Air Force recommendation, the Department of Defense chose in its FY 1983 budget submission to the Congress to address the near-term intertheater requirement and requested funds for 44 KC-10 and 50 C-5B aircraft. Although this option did not provide all of the airlift capability that the Department of Defense felt was required, defense officials argued that it provided the best near-term solution to the airlift shortfall. After much debate, the Congress agreed to the request.

Funding for the C-17 research and development remained in the budget for fiscal years 1983 and 1984. The Congress and the Administration, however, significantly constrained the C-17 budget each year, appropriating $60 million in fiscal year 1983 ($59 million of which was to be taken from lower priority Air Force programs) and $26.8 million in fiscal year 1984. Although this level of funds was sufficient to keep the program alive and the aircraft design teams together, it did not signify a commitment on the part of the Administration or the Congress to procure a C-17 aircraft in the immediate future.

In September 1983, the Air Force published the Airlift Master Plan (AMP). The document was presented as the Air Force long-term plan for the effective management and employment of airlift assets. It recommended that the C-17 be procured as the future airlift aircraft. In conjunction with this, it recommended restructuring the airlift forces by retiring some of the older C-130s and C-141s and transferring the remaining C-141s into the reserves. On February 27, 1984, the Secretary of Defense forwarded to the Congress a report validating the requirement concepts and design of the C-17 aircraft. It is also an endorsement by the Secretary of the force structure plans recommended by the Air Force in the Airlift Master Plan.

BACKGROUND

- Congressionally Mandated Mobility Study - airlift requirement of 66 million ton miles/day (MTM/D)
- Current and programmed airlift capability
- Long term investment plans

Background

As part of the Department of Defense authorization act for 1981, the Congress required the Department to conduct a study to determine overall U.S. military mobility requirements. This study, known as the Congressionally Mandated Mobility Study (CMMS) was presented to the Congress in April 1981 and has since been accepted as the most current statement of total airlift needs for the United States. The study recommended that the United States strive to acquire an additional intertheater air transport capability equivalent to 20 Million Ton Miles per day (MTM/D) to achieve a goal of 66 MTM/D.

The current airlift fleet can achieve approximately 45 percent of the goal. Due to a shortage of spares for the C-5 and C-141 aircraft, they would not be able to sustain a wartime utilization rate of 12.5 hours per day. Any decrease in the sustained utilization rate below 12.5 hours per day decreases the overall fleet capability. Programmed enhancements to include additional spares for existing aircraft and additional C-5, KC-10, and CRAF aircraft will raise the fleet capability to 48.5 MTM/D by the end of the 1980s.

Long-term airlift enhancements are directed toward the 17.5 MTM/D difference between the late 1980s programmed capability and the CMMS goal. Retiring existing aircraft or failing to support C-5 and C-141 aircraft wartime utilization rates of 12.5 hours per day would increase the difference between the 66 MTM/D goal and the capability of the programmed fleet.

QUESTIONS FOR THE CONGRESS

- Will budget limitations permit further additions to the airlift fleet?
- What long-term airlift fleet characteristics should the Congress pay for now?
- What is the future requirement for a tactical airlifter and how should that requirement be met?

Questions for the Congress

Congressional concerns over budget deficits have resulted in defense budgets below the levels originally requested by the Administration. Before the Congress considers which airlift alternative is preferable, it will have to determine the extent of possible additions to the airlift fleet within current budget constraints.

If the Congress considers the requirement for additional airlift sufficiently urgent, the decisions pending action will affect the entire nature of the airlift fleet for at least the next 30 years. Aircraft entering the fleet during the end of this decade should still be operational in the airlift fleet beyond the year 2015. Some characteristics that the Congress may wish to see in the fleet then may have to be paid for now.

Decisions the Congress makes concerning intertheater airlift may not satisfy future needs for a tactical or intratheater airlifter. The majority of the C-130s in the fleet today will have to be replaced early in the next century. Although the C-17 offers some intratheater capability, it may not satisfy the need for a C-130 follow-on aircraft. Tactical airlift requirements are not well defined today, but there are no plans to eliminate the need for a C-130.

PURPOSE OF THE BRIEFING

- Review the recommendation of the Airlift Master Plan
- Discuss alternatives for future airlift enhancement
- Discuss near term and longer term budgetary implications

Purpose of the Briefing

The Airlift Master Plan provided a clear alternative for structuring the future airlift fleet. The foundation of the plan is the C-17 aircraft. Under the Air Force alternative, at least 180 of these aircraft will be procured before the end of the century. The Air Force views this as a modernization alternative that will meet the intertheater airlift requirement while allowing them to streamline the current fleet.

As an alternative to the Air Force plan, the Congress could choose to continue to procure existing aircraft, namely C-5s and KC-10s, to meet a specific airlift requirement. This alternative projects the strengths and limitations of current airlift into the future.

This briefing presents a comparison of near-term and long-term costs of two alternatives. Since both meet the mobility requirement of 66 MTM/day, the difference in cost between the two alternatives may be the decisive factor. Near-term costs tend to reflect the acquisition costs associated with each alternative. Long-term costs reflect the steady state operating and support costs of the alternatives. In a more thorough study to be released this summer, CBO will also examine alternatives that emphasize sealift investments as directed by the Committee. Time was not available to include this analysis in this briefing.

INTERTHEATER AIRLIFT FLEET

	Number (PAA)	Capability a/ (MTM/Day)
Current Fleet		
C-5A	70	12.0
C-141B	234	15.4
CRAF		
Wide Body	39	6.0
Narrow Body	28	2.4
Programmed Additions		
C-5B	44	7.5
KC-10	41	4.5
CRAF	19	2.9
Air Force Preferred Program		
C-17	180	27.4

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a. Capability represents the theoretical capability of the fleet when all aircraft are operated at wartime utilization rates and no aircraft are withheld for other JCS contingencies.

Intertheater Airlift Fleet

The current fleet consists of a mix of C-5s, C-141Bs, and Civilian Reserve Air Fleet (CRAF) aircraft. The C-5 is designed to carry large bulky combat and support equipment over long distances and may be refueled in the air if necessary. It is the only aircraft in the fleet that can carry outsize cargo such as tanks. Built during the late 1960s and early 1970s, it provides the United States with a unique airlift capability unavailable to other nations. A typical C-5 squadron contains 18 aircraft each with a crew of six. Air Force manning policies require on the average 93 active-duty personnel and 64 reservists per aircraft.

The C-141B is the workhorse of the current fleet. Built in the early 1960s, it was designed to transport troops and equipment over long distances. It was not designed to carry outsize equipment like the C-5 but to carry other combat and support equipment such as personnel carriers and trucks. In the late 1970s, it was modified to allow aerial refueling and the fuselage was extended to allow it to transport more cargo. A typical squadron contains 18 aircraft each with a crew of five. Air Force manning policies require on the average 60 active-duty personnel and 50 reservists per aircraft.

The Civilian Reserve Air Fleet consists of commercial cargo aircraft currently operated by civilian carriers. In the event of mobilization, these aircraft will become available for transporting military cargo.

During the next five years, new C-5s and KC10s will be joining the airlift fleet. The new C-5s will increase the outsize cargo carrying capability of the fleet by over 60 percent. The KC-10 aircraft, a derivative of the commercial DC-10, can be used as an aerial tanker to refuel other deploying aircraft or as a cargo transport much as the 747s in the CRAF program. They cannot carry the outsize cargo, but they can carry most of the same cargo the C-141 can carry. A CRAF enhancement program is also planned. This is a government funded effort to modify commercial wide body passenger planes by equipping them with cargo carrying features such as stronger flooring and wider doors. They will continue to be operated by the airlines after they are modified.

The C-17 is the Air Force preference for future airlift. It is designed to carry the full range of combat and support equipment including outsize cargo as can the C-5, but not as much. When the C-17 was designed, the Air Force imposed operating requirements that will make the C-17 much more capable as a military transport. The Air Force wanted to expand the number of fields that can be used by the C-17 as compared to other transports. As such the Air Force plans to employ the C-17 not only as an intertheater airlifter but also as an intratheater airlifter. Technological improvements in the aircraft will allow it to operate with a crew of three. Plans are to organize C-17 squadrons with 16 aircraft, each requiring on the average 60 active-duty personnel and 37 reservists.

CURRENT INTRATHEATER AIRLIFT FLEET

	Number (PAA)	Capability (Tons/Day)
C-130A	104	1,868
C-130B	80	1,437
C-130D	8	144
C-130E	237	4,257
C-130H	83	1,491
TOTAL	512	9,197

Current Intratheater Airlift Fleet

The C-130 series aircraft was introduced into the fleet in the late 1950s. Various modifications have been applied to the aircraft over the years although the basic configuration of the aircraft remains unchanged. Designed primarily for transporting cargo over relatively short distances within a specific tactical theater, it has served as the workhorse of the intratheater fleet for over 20 years. Its utility has been its ability to resupply forward-deployed units with food, fuel, ammunition, and spare parts. Its use for special operations missions and for gunships attests to its versatility. New models of the C-130 will continue to provide tactical airlift capability over the next 30 years. The C-130 is operated by active-duty and reserve Air Force components. The C130-A model transports are currently in Air National Guard and Air Force Reserve units.

AIRCRAFT DESIGN CHARACTERISTICS

	C-17	C-5	C-141	KC-10	C-130
Outsize Load Capacity	Yes	Yes	No	No	No
Average Payload (tons)	48.3	68.9	27.5	41.7	12.6
4,000-Foot Runway Landing	Yes	Yes	No	No	Yes
3,000-Foot Runway Landing	Yes	Maybe[a]	No	No	Yes
Manpower per Aircraft	97	157	110	38	46

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[a] Lockheed believes that the C-5 has a 3,000-foot runway landing capability although it was not a design characteristic of the aircraft.

Aircraft Design Characteristics

Design characteristics of the aircraft differ. The C-5 because it is bigger than other aircraft can carry a larger average payload than the other aircraft. Also it can carry outsize equipment such as tanks, which no other aircraft, except the C-17, can carry.

Access to runways also varies by aircraft. The KC-10s and C-141s require longer runways while the C-5, C-130, and C-17 can operate on smaller runways often found in forward operating locations. This is an important feature when supporting Army units that are far forward in areas where road and rail travel is difficult.

Manpower per aircraft is also an important characteristic. Generally, the less manpower required per aircraft the lower the operating and support cost of the aircraft. When manpower is scarce or expensive, aircraft that are less manpower intensive may be more attractive.

CURRENT FLEET LIMITATIONS:

AIR FORCE ASSESSMENT

- Limitations on employment of C-5

- Age of the C-141B fleet

- Utility and age of the C-130 fleet

Current Fleet Limitations: Air Force Assessment

All of the aircraft in the current fleet have limitations. The Air Force has indicated that the original design features and the 1960s technology used in the C-5 limit its flexibility in projected deployment situations. The costs to own and operate it are also high. The C-5 was designed to operate on runways at least 4,000 feet long and 90 feet wide and off runways when surroundings and soil conditions permit. Today the Air Force believes that this capability may not be sufficient for delivering cargo to forward operating locations. The design criteria for the C-17 specified 3,000 foot runways 90 feet wide. They also consider the ground maneuverability of the C-5 a limitation in areas where the taxiways are small or ramp space is limited. Life-cycle cost of the C-5 is considered high due primarily to the crew size and number of people necessary to support and maintain a C-5 squadron.

The C-141B is limited primarily by the cargo it can carry and the average age of the fleet. It has roughly 40 percent of the average combat cargo carrying capability of the C-5 and cannot carry outsize equipment. Useful service life of the aircraft is also a question. The Air Force believes that operating the aircraft at the current average peacetime operating rate of 3.2 hours per day will force the retirement of many of the aircraft by the end of the century.

The C-130 is limited primarily by its relatively slow speed and small load carrying capability. Although it serves admirably as a resupply aircraft delivering spare parts, ammunition, food, and fuel to forward locations, some have argued that its capability may be insufficient for certain contingency areas such as Southwest Asia where the delivery distances may be greater. Historically, however, the C-130 has provided more than adequate airlift support to forces deployed in numerous contingency areas. Age, however, is a limitation for many of the C-130 aircraft. Based on Air Force assessments, approximately 112 C-130 aircraft will have to be replaced near the turn of the century.

AIR FORCE MASTER PLAN RECOMMENDATIONS

- Buy 180 C-17 transports beginning in 1988
- Conserve service life in C-141 fleet by transferring 180 to Reserve component
- Retire without replacement 180 C-130 tactical transports

Air Force Master Plan Recommendations

The Air Force Master Plan combines procurement of C-17s and reorganization of existing assets to meet the 66 MTM/day goal and to minimize long-term ownership costs. The centerpiece of the plan is procurement of 180 (PAA) C-17 aircraft beginning in 1988 and continuing through the end of the century. In order to conserve the remaining service life of the C-141 fleet, the Air Force plan calls for transferring 180 C-141s into reserve units beginning in 1991. (Some 54 C-141s will be retired in the Air Force plan at the end of the 1990s because of age.) Reserve units operate aircraft at lower peacetime tempos than their active-duty counterparts; as such, the remaining service life of the C-141s is used up less quickly. However, conserving service life also reduces wartime capabilities, necessitating purchase of a larger number of C-17s than may otherwise be needed. Finally, the master plan calls for retirement without replacement of 180 C-130 transports. Although only 112 will have neared the end of their useful service life during the 1990s, the Air Force chose to reduce the size of the fleet further to conserve manpower spaces. The Air Force believes that the tactical contribution of the C-17 can make up for those C-130s retired.

While necessitating significant investment expenditures over the next ten years, the Air Force master plan seeks to minimize long-term life-cycle costs by several means. First, the C-17 is likely to be a significantly less expensive aircraft to own and operate because of special design features being incorporated. It will require smaller personnel complements and less maintenance. Second, shifting C-141s into the Reserve component will minimize peacetime operating costs. Finally, the C-130s not replaced free financial and manpower assets.

FY 1985 PROGRAM DECISIONS

- Full-scale engineering development funds in FY 1985 budget request
- Will budget pressures permit new program starts?
- Are less expensive alternatives available?
- What long-term implications come from efforts to economize in the short term?

FY 1985 Program Decisions

This year the Department of Defense has requested $129 million for the C-17 to allow full-scale engineering development of the aircraft. Although this is relatively small compared to the entire defense budget request, it implies a willingness on the part of DoD and the Congress to follow through with the C-17 program at a total acquisition cost of approximately $27 billion in fiscal year 1985 dollars.

Reducing the C-17 program request this year will contribute little to deficit reduction. On the other hand, approval of the budget request may signify a willingness on the part of the Congress to allow new program starts at the same time it is looking for ways to reduce defense spending as part of the deficit reduction measures being considered.

If the Congress judges that further investment in airlift is of sufficient priority, should funds be directed toward a new program or an extension of current production programs? The two alternatives considered in this analysis examine the costs of purchasing additional airlift capability through a new program (C-17) or continuing current programs (C-5, KC-10, C-130). A new transport offers military features the Air Force believes are necessary in the long run. Alternatively, extending the purchases of C-5s, KC-10s, and C-130s will lock in a force structure for the next 40 years that the Air Force believes cannot meet all mission requirements.

ALTERNATIVES

	I Air Force Master Plan	II Extended Procurement Plan
C-17	180	--
C-5	--	41
KC-10	--	129
C-141 Retire	54	54
C-141 Reserves	180 (2crews each)	180 (4crews each)
C-130		
Retire	180	112
Replace	0	112

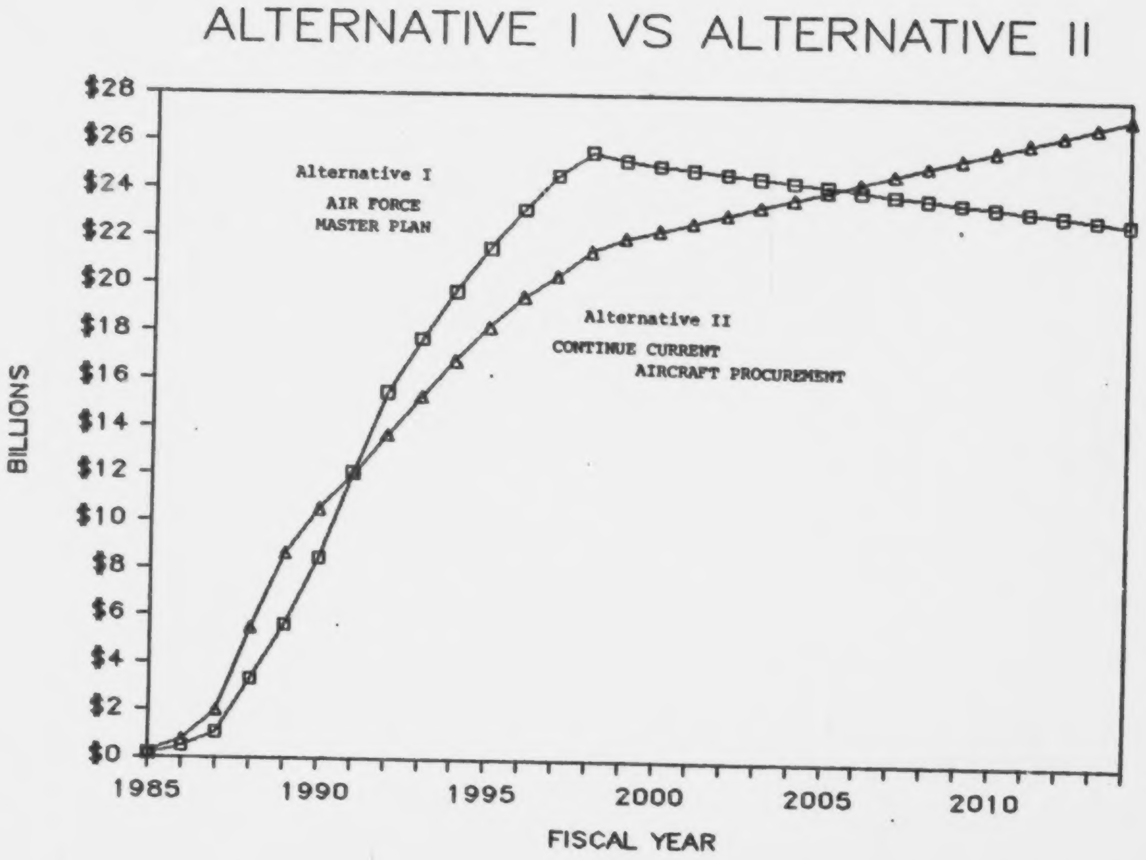
Alternatives

Alternative I is the Airlift Master Plan recommendation. It procures 180 C-17s by 1998, retires 180 C-130s and 54 C-141s between 1991 and 1998 and transfers 180 C-141s to the reserve forces by 1998. It also reduces the operational capability of C-141s by reducing the ratio of air crews per aircraft to 2.0 from the current level of 4.0.

Alternative II continues procurement of the C-5, the KC-10, and the C-130 aircraft. The C-130 procurement continues at the current level of 10 aircraft per year to replace the aging 112 C-130s in the reserve forces. Beginning in 1988, an additional 41 (PAA) C-5 aircraft are procured to provide increased outsize capability to the airlift fleet. Also, 129 KC-10s are procured using a multiyear procurement scheme with the first aircraft delivered in fiscal year 1988. As in the Air Force plan, 54 of the C-141s are retired and the remaining 180 are transferred to the reserve forces. However, the operational capability of these planes are retained at the current level by continuing to operate them at an air crew to aircraft ratio of 4.0.

The proposal to place C-141s in the reserves is a contentious issue. The following slide evaluates what effect operating the C-141s at a 4.0 crew ratio versus the planned 2.0 crew ratio would have on the alternative cost. The second contentious issue raised by critics of the master plan concerns the use of C-17 as a tactical transport. That issue is also examined below.

FIGURE 1


ALTERNATIVE I VS ALTERNATIVE II
BILLIONS
$28
$26
$24
$22
$20
$18
$16
$14
$12
$10
$8
$6
$4
$2
$0
1985
1990
1995
2000
2005
2010
FISCAL YEAR
Alternative I
AIR FORCE
MASTER PLAN
Alternative II
CONTINUE CURRENT
AIRCRAFT PROCUREMENT

Alternative I vs. Alternative II

Both alternatives provide the same quantitative transportation capabilities, though there are important qualitative differences which are discussed below. The primary quantitative feature distinguishing the two alternatives is cost.

The Air Force plan (Alternative I) is cheaper in the near term (see Figure 1). Over the next five years, the Air Force plan costs about $3 billion less than Alternative II. This occurs because the Air Force plan avoids buying 112 C-130 transports over the next 10 years. In addition, since Alternative II buys more of the C-5 and KC-10 aircraft that are already in production, procurement funding over the next five years would be greater than under the Air Force plan.

Over the next 20 years, however, the Air Force plan would be more expensive by about $0.7 billion or 3 percent. During this period, heavy procurement costs for the C-17 push up the costs of the Air Force plan.

Over the next 30 years, the Air Force plan would again be the cheapest by about $4.4 billion or 16 percent because of lower peacetime operating costs. The Air Force plan would operate 170 fewer aircraft than Alternative II and would have less costly C-17s rather than the mix of C-5 and KC-10s. Indeed, when all the new aircraft have been purchased and are in the fleet the Air Force plan would be approximately $500 million per year less expensive to operate than Alternative II.

Each alternative achieves long-term manpower savings, although in different ways. Alternative I offers active-duty manpower savings of over 3,000 spaces while requiring only a little over 300 additional reserve spaces. Alternative II, on the other hand, saves over 6,000 active-duty manpower spaces but requires nearly 12,000 additional reserve billets.

As noted above, while both alternatives provide the same quantitative transportation capability (66 million ton miles/day for intertheater operations and at least 9,000 tons/day for tactical operations) there are important qualitative differences between the two fleets, which tend to favor the Air Force plan. In Alternative I, 41 percent of the fleet capability would be provided by the C-17 which is designed to be a more flexible military asset. The C-17 represents a 15-year leap in technology over the C-5, incorporating updated electronic components and more efficient engines. Further, it embodies design features that reflect the benefits of 12 years of operating experience with the C-5s. Advances in avionics and cargo loading designs allow the C-17 to operate with a crew of three as opposed to the five or six found in other large military cargo aircraft.

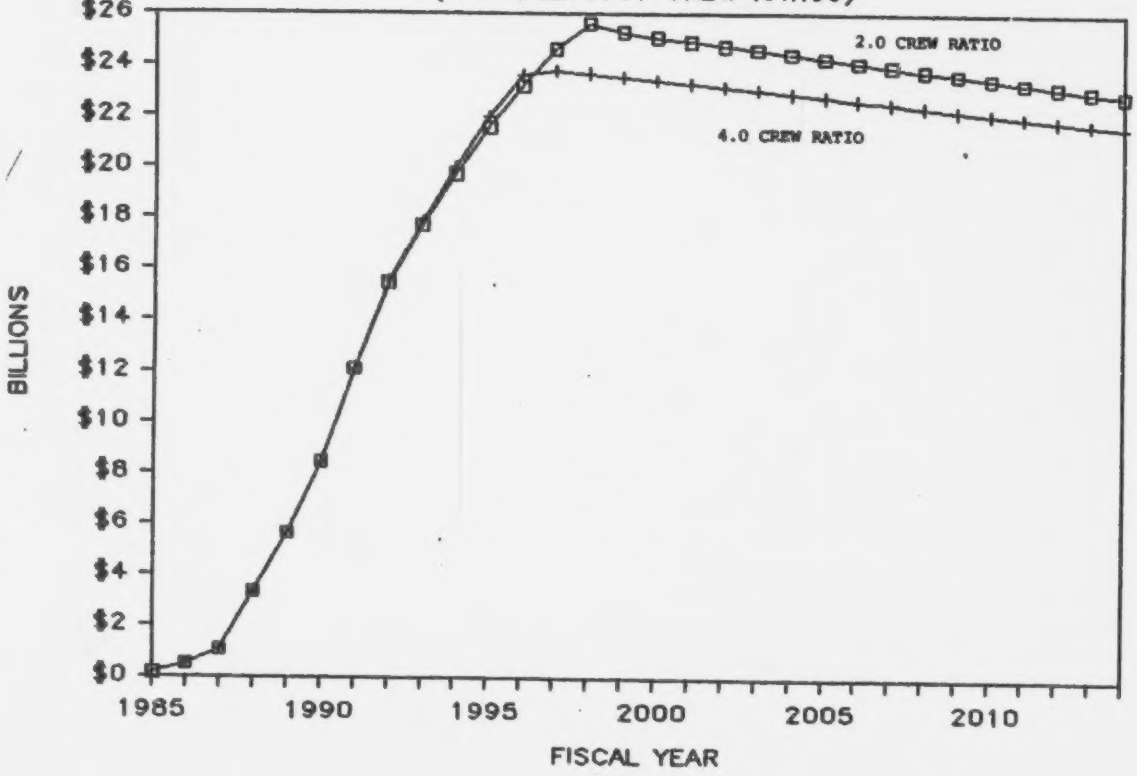
Further, Alternative II avoids the use of additional KC-10 tanker/transports. The KC-10, while capable of carrying all the cargo carried in the C-141, is substantially less flexible as a cargo transport. It requires specialized cargo handling equipment to load and unload, unlike the C-130, C-141, C-5, and C-17. Further, because of design features, it is limited to operate at only the larger airports with long runways with substantial load-bearing properties. This will constrain major airlift operations to a limited number of theater air bases.

Finally, it should be noted that while the KC-10s currently in production were purchased as cargo transports, they are being operated in peacetime by the Strategic Air Command as tankers. Since the Air Force maintains that its tanker requirements significantly exceed its current resources, even if the KC-10s are included, it is of some question whether added KC-10s would be available in a general war for airlift operations.

FIGURE 2

ALTERNATIVE I

(VARIABLE C141 CREW RATIOS)

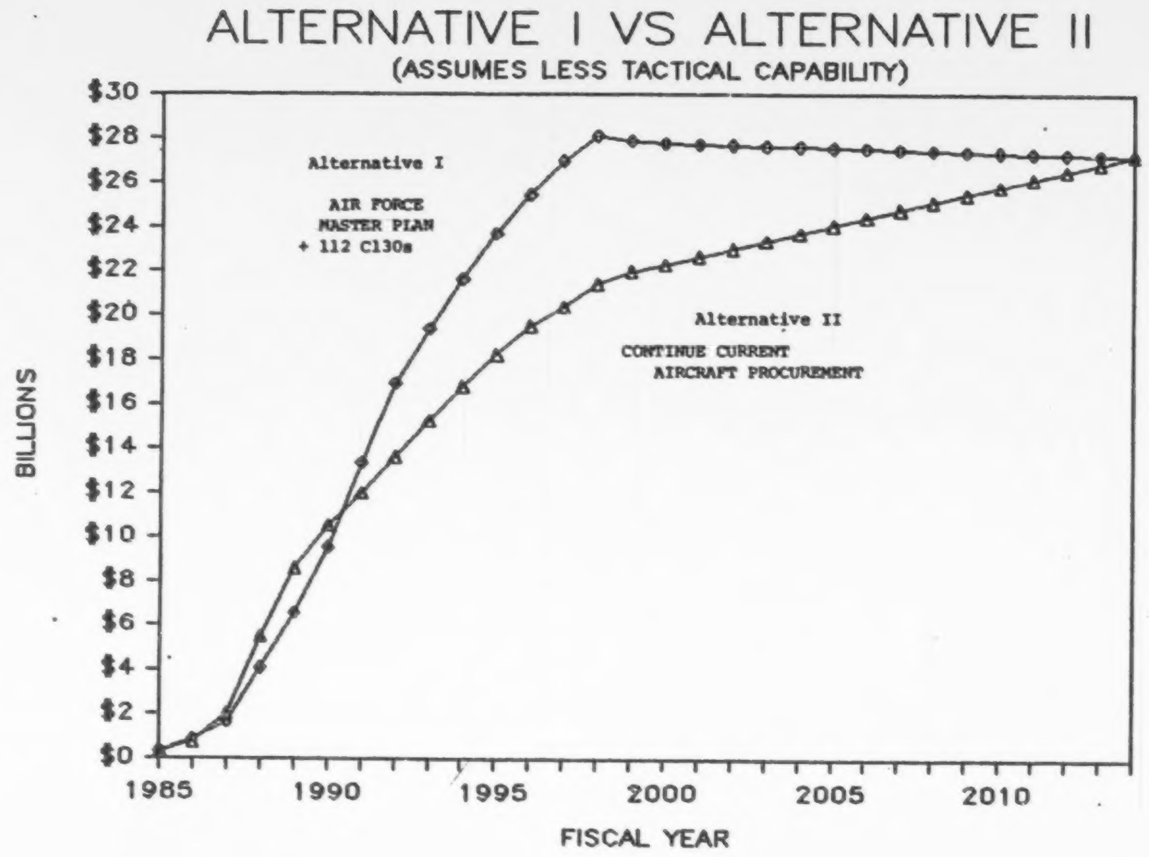


Areas of Uncertainty: Use of C-141s

The Air Force master plan calls for transferring the C-141s into reserve units and operating them at half the current rate by providing only two crews per airplane instead of four per aircraft under current operating procedures. The Air Force adjudged this was necessary to conserve the remaining service life of the C-141. Critics of the master plan have argued that it also cuts back the contribution of the C-141 toward the 66 MTM/day airlift goal and inflates the number of C-17s required to meet that goal. The Air Force master plan calls for purchase of 180 PAA C-17 transports. If the crew ratio of the C-141 is retained at current levels, only 140 C-17s would be required to meet the airlift goal.

However, this has little effect on cumulative costs (see Figure 2). Over a 20-year period, retaining higher C-141 crew ratios and buying fewer C-17s would cost only 6.3 percent less than the Air Force plan. After 30 years, the alternative would be only 5 percent less than the Air Force plan. These cost projections do assume that all the C-141s remain in the reserves, so there is a significant difference in the composition of manpower between active-duty and reserve forces if C-141s are retained and operated at higher levels.

FIGURE 3



ALTERNATIVE I VS ALTERNATIVE II
(ASSUMES LESS TACTICAL CAPABILITY)

Area of Uncertainty: C-17 as Tactical Transport

The second area of uncertainty concerns the projected use of the C-17 in tactical airlift operations and the feasibility of retiring 180 C-130 transports as a "fringe benefit" of proceeding with the C-17 program. The Air Force master plan suggests that the operational flexibility of the C-17 in tactical operations equals the capabilities of 180 C-130 transports. The C-17 was designed to fly directly from U.S. military bases to forward operating areas, avoiding the requirement to land at intermediate staging bases in the combat theater with C-130s ferrying cargo forward from that point. The Lockheed Corporation contends that the C-5 was designed to accomplish a parallel mission. No one contends that the KC-10 is capable of this mission.

There is a detailed tactical mobility requirements analysis underway in DoD. The analytic methods used in the Air Force master plan have been contested, and will be examined in greater detail in the more comprehensive CBO analysis that will be available later this summer. In order to demonstrate the impact of less optimistic assumptions, CBO examined the cost implications on the Air Force alternative of buying replacement C-130s for those early model transports in Guard and Reserve units that are reaching the end of their service lives over the next ten years. For this analysis, CBO has assumed that the Air Force will have to replace at least 112 of the oldest aircraft in the C-130 fleet.

As seen in Figure 3, amending the Air Force program to include replacement C-130s does not substantially affect near-term costs, but does prolong the period until Alternative I would be less expensive—until the year 2014. This amended program would increase the acquisition costs of Alternative I by 8 percent and the operating and support costs by 10 percent.

FIVE-YEAR PROGRAM COSTS a/

(Millions of current dollars, by fiscal year)

	1985	1986	1987	1988	1989	Total
Alternative I (Airlift master plan)	129	364	637	2,620	2,736	6,486
Alternative Ia (C-141 4.0 crew ratio)	129	364	637	2,620	2,736	6,486
Alternative Ib (Supplemented by 112 C-130s)	313	558	841	2,834	2,960	7,506
Alternative II (C-5, KC-10, C-130)	252	504	1,262	3,788	3,605	9,501

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a. Purchases of the 50 C-5s and 44 KC-10s currently underway are not included.

Five-Year Program Costs

This slide presents a comparison of the (largely investment) costs associated with the two primary alternatives and with the amended Air Force master plan alternative (marked Alternative Ia and Ib). The Air Force alternative requires the lowest level of resources over the next five years. The Alternative I spending path was incorporated in the fiscal years 1985-1989 five-year plan. It is unclear at this stage whether changes to that plan consistent with the President's directives to trim $57 billion over the next three years will have an impact on the C-17 profile. If the Congress chooses to proceed with Alternative II, it would increase funding requirements and raise deficits, rather than decrease them in the near term.

Alternative Ia is identical in cost over the next five years to Alternative I because the transfer of C-141s to reserve units would not begin until 1991. Alternative Ib is somewhat higher than I because it includes purchase of C-130 transports in a production profile identical to that incorporated in Alternative II. Alternative II represents primarily investment expenditures, but does include operating and support costs for some of the KC-10s that would enter the fleet as early as 1988.

COST SUMMARY

(Billions of constant 1985 dollars)

	Total Costs 1985-1989	Total Costs 1985-2004	Total Costs 1985-2014
Alternative I	5.6	24.4	22.8
Alternative Ia	5.6	22.9	21.6
Alternative Ib	6.5	27.6	27.2
Alternative 2	8.6	23.7	27.2

Cost Summary

The cost summary shows cumulative expenditure projections for each alternative after 5, 20, and 30 years. The cumulative cost of Alternative I decreases between the 20-year mark and the 30-year mark. This is caused by the lower operating and support costs of Alternative I relative to current operating and support costs. All costs are additions to costs for operating existing forces and completing current investment plans. Since the Air Force alternative would operate fewer aircraft compared to the current baseline, cumulative costs decrease gradually in the future. During the same period, the cumulative costs of Alternative II steadily increase.

None of these costs incorporate discounting. Each alternative will be evaluated on a discounted basis later in the final CBO report.

CONCLUSIONS

- Any airlift additions uncertain in current budget environment
- Air Force program represents least cost alternative in near term and very long term, but is more expensive in the mid-term (between 5 and 20 years)
- Tactical role of C-17s in future fleet is most important area of uncertainty

Conclusions

This analysis suggests a decision by the Congress to expand airlift resources over the next five years will lead to significant near-term and long-term costs. Any further investment in airlift will entail difficult choices in a period of relative budget austerity. The Air Force alternative was included in the current budget and five-year plan, but may be amended in light of pending efforts by DoD to trim $57 billion over the next three years from the budget.

One alternative to the C-17—continuing production of C-5 and KC-10 aircraft beyond current plans—is more expensive than the Air Force program over the next five years. After 1991, however, this alternative would be significantly less expensive for a period of 14 to 23 years. The range of uncertainty reflects questions over the tactical contributions of the C-17. Those questions will be evaluated in a more comprehensive manner in a forthcoming detailed CBO report.

Senator COHEN. Senator Wilson?
Senator WILSON. Thank you, Mr. Chairman.

C–17/C–5 PROGRAMS REDUNDANT

General Ryan, it seems an appropriate time to ask this question. The Congressional Budget Office claims that the C–17 and C–5 programs are redundant. Do you agree or disagree, and can you tell us why?

General RYAN. I disagree, Senator. It really to some extent is an apples and oranges comparison, but there are common points. One is the ability to move large, to include outsize, combat equipment over long distances, air refueling across inter-theater distances, and deliver them there.

But I think there the similarity ceases. In that regard, the C–5B being a larger aircraft obviously has a greater capacity to move things ton mile wise over long distances. When you get to the terminal area, the C–17 has anywhere from a 1.8 to a 3-to-1 advantage in terms of airfield availability for delivery of those forces into the combat theater.

And that becomes a very essential characteristic of the aircraft because it relieves the piling up of equipment and supplies that we referred to a little bit earlier at those major aerial ports of debarkation which certainly become lucrative targets to the enemy and, of course, obviates the need to transload and transship that equipment close to where the combat commanders need them.

Beyond that, the aircraft is more survivable. It has a good bit of survivability built into it, and I will refer to my earlier testimony in that regard—I addressed it in some detail—but suffice it to say that my airlift pilots would far prefer to take a C–17 into a forward area where threats were relatively high than they would any other airlift aircraft.

Its reliability promises to be much greater, and while I realize the contention can be made that we do not have a C–17 in hand and, therefore, the proof of the pudding is yet to be seen, the reliability improvement warranty type contract associated with the C–17 literally guarantees not only reliability, maintainability, and availability of the air frame on a daily basis, to include a low 18.6 maintenance manhours per flying hour, but also guarantees the performance characteristics that are required to allow that aircraft to operate as I have just described. Those characteristics are not shared to that extent with the C–5, and so I think there the two aircraft depart.

Finally, in terms of operating costs over a long period of time, the operating and support costs and particularly the manpower requirements of the C–17 are dramatically lower than the C–5, even assuming the C–5 will perform as well as is expected in the B model—and that is about 40 maintenance manhours per flying hour.

Senator NUNN. May I interject just one point here? What we are talking about is about one aircraft that is out there flying that we know about and another one that is on paper. We have not had, at least in the last decade, any paper aircraft with cost projections anything like that worked out, including operating costs. Maybe the F-16 is an example that would be an exception.

Do you know of any aircraft that has met its paper requirements in the last 10 or 15 years other than the 16's?

General **Ryan**. I would have to research that to answer precisely, Senator. I would agree with you that our experience has certainly been mixed in that regard. I think it is important, though, to note the type of paper that we are talking about when we talk about the C-17, and again to go back to that warranty, this will be the first time that the Air Force has ever bought an aircraft under a reliability improvement warranty type contract.

Significantly, the only other major system that we have bought under that type of contract——

Senator **Nunn**. Is that a cost guarantee contract?

General **Ryan**. It is a contract that says there are certain performance and reliability and maintainability parameters that will be demonstrated over an adequate length of time of service and the contractor guarantees that those parameters will be met or corrected at his cost until they are met.

We bought the avionics suite on the F-16 on the same kind of contract and I think you will find that our expectations, as you noted, have been excellent on the F-16 avionics.

Senator **Nunn**. I do not want to interrupt Senator Wilson any further. What is difficult for us to gauge is when you are really trying to balance costs on this and you have got one out there flying that we know about and the other one on paper, and you look at any track record in the last 20 or 30 years, concerning cost projections and what has really happened, there has to be some kind of a percentage factor add-on in any kind of realistic comparison based on historical experience.

Now how you get to that, I do not know, but the track record is too erratic in terms of cost projections and what has really happened that these comparisons, when you have one on paper and one out there flying, actually are almost meaningless based on history.

General **Ryan**. I think a significant factor in that, Senator—and I would agree with you that phenomenon has certainly been demonstrated a number of times—is the amount of sophistication involved in the individual elements of new technology that comprise the C-17. None of those elements individually constitute anything like the forward edge of the envelope, so to speak, which we talk about.

We talk about powered lift technology; that has been demonstrated in over 800 hours of flight on the YC-15. In the case of the directed-flow thrust reversers, the same is true. The aircraft has completed all its high-speed and low-speed wind tunnel tests to date, and they have done nothing but validate the experience that was gained on the YC-15.

Beyond that, the supercritical wing and the winglets, which contribute greatly to its economy in flight, are proven daily in the operation of commercial airline aircraft. And, finally, the engines, the Pratt and Whitney 2037's, which are as you probably know, installed on the 757 series Boeing aircraft, and at the time the C-17 comes into service, there will be somewhere around 5.7 million hours of operation in those engines behind us.

So we are talking about a mature propulsion system. You put all that together and integrate it into one aircraft, the results are dramatic in terms of capability and yet, individually, we believe the risk is low.

Senator **Nunn**. Thank you, Senator Wilson.

Senator **Cohen**. Your time will be extended to take account of the interruption.

Senator **Wilson**. Thank you, Mr. Chairman. I think it was valuable and Senator Nunn was in fact pursuing a line of questioning that I had intended myself, so I am grateful for the opportunity to get it into the record.

In light of the deficit constraints that are upon us and what that portends in the way of defense spending cutbacks, I gather that the Air Force is persisting in support of the airlift master plan. Evidently, what you think we can afford, and from what I hear you saying we are going to have to afford is both the C-5 and the C-17 programs; is that right?

General **Ryan**. Yes, that is right. Yes, sir. We are pursuing the 50 C-5B's, which begin delivery next year, as well as the C-17. We do not believe we can afford not to.

Senator **Wilson**. Is there not a cheaper way of attaining the CMMS-recommended capability of 66 million ton miles per day other than by developing an entirely new aircraft?

General **Ryan**. I think there may be a cheaper way of achieving the numerical value of 66 million ton miles, if that were the only thing that we focused on—strictly capacity—but from the standpoint of an operational commander, and that is the standpoint I have to take, I have to think in terms of capability. I have to think in terms of flexibility and how survivable is the aircraft, how well it does the entire spectrum of airlift, actions that are required of a good airlift airplane.

Certainly I could take an existing wide-bodied commercial jet, for example, beef up the floors, as we do in the CRAF enhancement program, and probably prove that I can move more million ton miles per day than I could with almost any other combination. The C-5 as well is optimized in that regard.

But from the standpoint of the requirements, they are not, and for those reasons we are pursuing the C-17. It does satisfy in a single aircraft almost all our documented airlift requirements beyond fiscal 1989 and it does so in a survivable way.

If we talk about costs, the costs are significantly lower. Combining acquisition and operating support costs possible over a 30-year lifetime—and that is what we are talking about with an aircraft of this magnitude—we are some $15 billion to $16 billion cheaper. We can do it with about 15,000 fewer people, and that is a significant factor when we talk about the total end strengths. That would be the end strengths including the Reserve and Guard.

ACHIEVING 66 MILLION TON MILES PER DAY

Senator **Wilson**. You may have answered my question. I was going to observe that Lockheed has an ongoing line for the C-5 and the C-130. Why is the C-17, in your view, the proper solution to achieving the 66 million ton miles per day?

General RYAN. Well, I think much of what I just said does address that question, Senator.

Senator WILSON. In other words, you think it is a cost savings over the long pull in manpower requirements?

General RYAN. The cost savings combined with the operational flexibility gained with the aircraft, the fact that it does allow direct delivery of all the Army's equipment, as well as the Marine Corps' and the Air Force's right to where it is needed. It can be used in the intra-theater role interchangeably with inter-theater.

All of those things combined make it the correct solution to our airlift shortfall. It is also, I might add, very complementary. It fits in very well with the existing airlift force. The C-5A and B are very fine aircraft, and we could not get along without them. They do a fine job of moving equipment—the C-141 as well. You put the whole force together and you have got a winning combination.

Senator WILSON. It is my understanding, General Ryan, that an unsolicited proposal has been submitted for further tests of the C-5. Does the Air Force plan further tests in accordance with that proposal?

General RYAN. We do not. The proposal actually is a request to demonstrate some capabilities. We have replied to Lockheed, the corporation that forwarded that unsolicited proposal, and we have expressed some interest in two points that they raised. One was the proposal that the aircraft would operate at significantly higher gross weights than it is currently certified to, and secondly we are interested in the assertion that the aircraft might be backed up.

We have some fairly severe reservations about being able to do either one of those things, and I have discussed them in some detail a little bit earlier in my testimony. Beyond that, the other elements of the demonstration proposal consist of things that we know the aircraft can do already based on prior testing and our operational experience with the aircraft.

And then there is one that we believe would pose a threat to the aircraft, a danger, and that is the low altitude parachute extraction.

Senator WILSON. So are you proposing the full-scale engineering development for the C-17 be authorized prior to completion of whatever?

General RYAN. Absolutely. Regardless of the outcome of those tests, if completely successful from the viewpoint of Lockheed, they would offer variations in our approach to the aircraft but would not change one iota, really, our view of the requirements for our future force structure.

C-5'S ABILITY TO OPERATE ROUTINELY ON SMALL FIELDS

Senator WILSON. You may have discussed this already—and if so, Mr. Chairman, I apologize and you can simply comment—does the C-5 have the capability to operate routinely in and out of small, austere air fields?

General RYAN. No, sir, I do not believe it does. The aircraft, the C-5, with certain gross weights on board can land on airfields down to as short as 3,000 feet. Our problem is that people who build 3,000-foot air fields do not build them very wide normally. Ninety feet you will find is as wide as those airfields come, and many times they are 60 feet wide.

They also do not build turnarounds at the end or wide taxiways that an aircraft the size of a C-5 could operate with. And that results in the ability to put the aircraft into the airfield but then little more. The aircraft requires in normal circumstances 143 feet of runway to turn around in, or a hammerhead at the end of the runway of about that size, 143 to 150 feet. It also requires taxiways between 60 and 75 feet in width to operate safely under routine conditions.

We have, therefore, developed parameters under which we operate the aircraft both in peacetime and in wartime, and believe me we press the aircraft to the limit as far as the aircraft and the crew because it is to our advantage to be able to get into as many airfields as possible and we call for 5,000 by 90 as the minimum size with adequate turnaround capability and taxiways normally 75 feet wide.

Senator COHEN. Senator Wilson, would you yield for a moment?

Senator WILSON. Certainly.

Senator COHEN. It would be helpful, General Ryan, if you would perhaps put together a point paper for the benefit of the subcommittee, showing the requirements, the pros of the C-5, the liabilities of each of the aircraft and what has led you to your conclusions, especially in view of the fact that you may have a funding disparity. Also, it could include what weight you give to the cost factor versus the need factor in terms of your anticipated requirements for the future, and take into account the kind of air-land battle analysis that has been done. Perhaps you could put it together into one document so that those of us on the committee could have that?

I think that would respond to Senator Wilson's questions and perhaps even those of Senator Nunn.

General RYAN. I would be happy to do that, sir. You may not have had an opportunity to see the C-17 validation report that Secretary Weinberger sent over recently. It was designed to do essentially what you have described, but we will take a close look at that and make sure it covers all the points that you just mentioned.

Senator COHEN. Senator Wilson?

Senator WILSON. Thank you, Mr. Chairman.

AUSTERE FORWARD AIR STRIPS

General Ryan, the Chairman asked a question a moment ago about the concern that has been expressed with regard to subjecting an expensive airplane to the possibility of loss by putting it into these austere forward air strips, and those air strips typically, as you have just indicated, apparently are now short and narrow and lack additional taxiways and areaways at the end for parking.

In light of the concern that we have about the safety of the aircraft and its ability to get in, discharge its load, and get out, what happens if in fact someone who is a good and gutsy pilot can take a C-5 in to such an air strip? What does he do once it is down in terms of the ability to bring another aircraft to move that load and get out?

General RYAN. Well, under the worst situations it will close the airfield, and perhaps close it to the point where semi-emergency measures would have to be taken to get the airplane out. Under the best of circumstances, it is very difficult for a pilot landing at a forward airfield in an aircraft the size of a C-5 without the designed-in capability to negotiate those types of turns to do so on a routine basis and do it safely.

Perhaps with a number of ground crewmen outside marshaling him, you know, those kinds of turns could be made, provided there was enough concrete there to accommodate the aircraft. But that slows down the flow, and your question addresses really what airlift is all about, and that is the flow of aircraft through an airfield as opposed to a single aircraft making a landing there.

Seldom, if ever, is one aircraft load of anything enough to satisfy a requirement, but I would turn to my friend here on the left, who requires large numbers of loads in quick succession. If you cannot accommodate that with an airlift flow, then you are in trouble.

Senator WILSON. General Mahaffey, would you care to add anything to General Ryan's comment?

General MAHAFFEY. I think he has stated it very well. The ability to put troops and supplies, including outsize equipment, into those kinds of airfields in rapid succession is fundamental to the buildup of combat power and/or resupply of the forces in that area.

Senator WILSON. Mr. Chairman, I have some additional questions, if we are going to go on a second round.

Senator COHEN. I think we will.

I have looked at the executive summary of the validation study for the requirements and have just glanced at the complete document very quickly, but it appears to answer most of the questions that I have and we will see to it that the other members have copies of it. We will go through and see if we cannot summarize those points but I think most of the questions I have are included in that validation requirement, and I will include that as part of the record.

General RYAN. We would be happy to respond to any that are not covered.

[The information follows:]

THE SECRETARY OF DEFENSE
WASHINGTON, THE DISTRICT OF COLUMBIA

2 7 FEB 1984

Honorable John G. Tower
Chairman
Committee on Armed Services
United States Senate
Washington, D. C. 20510

Dear John:

As directed by the FY 1984 Authorization Conference Report, attached is my report validating the requirement, concepts, and design of the C-17 aircraft. This aircraft meets the requirement to increase intertheater airlift capability and also increases intratheater airlift thus improving our total airlift system. The report addresses the need to modernize the airlift force and explains how the rationale used in developing C-X requirements is still valid and will provide an aircraft that will address a broad spectrum of airlift problems.

Sincerely,

Attachment

DEPARTMENT OF DEFENSE

REPORT TO THE COMMITTEES ON ARMED SERVICES
OF THE
SENATE AND HOUSE OF REPRESENTATIVES

SUBJECT: Validation of the Requirement, Concepts and Design for the C-17 Airlift Aircraft

EXECUTIVE SUMMARY

This report to the Congress validates the requirement, concepts and design of the C-17 aircraft as required by the FY 1984 Department of Defense Authorization Report. It quantitatively and qualitatively examines the requirement for additional airlift. The report describes how the concept and design of the C-17 not only meet those requirements but corrects deficiencies in the existing airlift system at a comparatively low life cycle cost.

The current airlift system cannot meet existing and forecast requirements to deliver combat forces rapidly to potential conflict areas. Intertheater airlift capability is less than half the minimum level recommended by the Congressionally Mandated Mobility Study. Even after programmed procurement of C-5Bs, KC-10s, Civil Reserve Air Fleet Enhancement, C-19s (Air National Guard B-747s), and spares, airlift capability will remain approximately twenty-five per cent below the minimum level. We must have more intertheater airlift if we are to realize the combat potential of our conventional ground and air forces.

Airfield congestion limits our choices for eliminating this shortfall. Even with our programmed airlift force, we expect local saturation to occur at times during the course of a deployment forcing delays or diversions to more distant airfields and increasing intratheater movement demands. Consequently, to be fully effective, additional airlift forces must be able to operate routinely through small austere airfields not suited to our current intertheater airlift force.

We also lack capability in several major areas of intratheater airlift. First, we cannot transport heavy, outsized[1] Army equipment to a vast majority of small austere airfields which comprise most of the Free World's runways. Additionally, the productivity of the C-130 is seriously reduced carrying cargo over the long intratheater distances found in Southwest Asia, Africa, and other areas of the Third World.

The current airlift force is aging and has become technologically dated, especially over the last two decades. At current peacetime flying rates, the

20-year-old C-141 will reach its service life limit near the year 2000, with retirements beginning in the mid-1990s. Older C-130s will also be retired in the mid-1990s. We must replace these aircraft while considering manpower constraints, airlift capability, operating costs, and procurement costs.

The Air Force Airlift Master Plan recommends acquisition of 180 primary mission C-17s (210 total) to meet the minimum intertheater airlift requirement, increase intratheater capability, and modernize both the active and reserve airlift force structure. An integral part of the airlift system, the C-17 will carry large payloads over intercontinental distances, and deliver them into three times as many runways as our current force. This ability reduces both delivery times and congestion at main operating bases by eliminating transshipping some payloads with intratheater airlift or ground transportation.

C-17 design features such as advanced technology airfoils, externally blown flaps, high-thrust engines, and exceptional air and ground maneuverability increase its ability to perform the direct delivery mission. Additionally, acceleration, deceleration, climb and descent rates increase survivability in a hostile environment. Redundant systems will limit the effect of the loss of a single component, no matter how critical.

To improve logistics performance, support high wartime utilization rates, and reduce operating costs, the C-17 takes advantage of today's proven technology being used on many commercial aircraft. Avionics include the latest advances in digital computer hardware and software, such as the systems in use on the DC-9-80, Boeing 757, and Boeing 767. Before its first flight on the C-17, the Pratt and Whitney PW2037 engine will be proven in over 3.5 million hours of commercial service on the Boeing 757. These and other design features make the C-17 comparable to the C-141 in operating, maintenance, supply costs, and manpower requirements, yet the C-17 will provide over twice the capability.

To ensure these design features produce low support costs, the C-17 contract contains a unique warranty with specific reliability, maintainability, and availability (RM&A) parameters. These will be the best large aircraft RM&A performance figures ever. Should the C-17 fail to achieve any of the warranted values, the contractor will provide corrective action at no increase in contract price.

Requirements for intertheater and intratheater airlift remains unfilled and modernization is becoming more critical. The C-17 will be a more survivable aircraft specifically designed to increase inter and intratheater capability and provide theater commanders additional operational flexibility. The inherent capability of the C-17 to perform both the inter and intratheater missions will produce significantly reduced life cycle cost, particularly in manpower, over any multi-aircraft solution examined.

PART I

THE REQUIREMENT

The existing imbalance between forces to be moved and the wartime airlift available is well documented. All recent mobility studies have concluded that airlift delivery capability must be increased. Combat forces that cannot be deployed in a timely manner are of little value in deterring a conflict or in winning if deterrence fails. The deficiency in wartime airlift capability is significant and consists of problems with both the quality and quantity of airlift available. The additional intertheater capability that the C-17 will provide increases the total system's capability. It is designed to carry all categories of equipment over an intercontinental distance and deliver it into small, austere airfields^{2}, and also add intratheater capability while modernizing the airlift force. The operational flexibility derived from obtaining an adequate intratheater outsize cargo capability is vital to keep pace with the development of rapid deployment and battlefield mobility concepts.

INTERTHEATER REQUIREMENTS AND CAPABILITIES

Since the mid-1970s, estimates of the forces needed for North Atlantic Treaty Organization (NATO) reinforcement increased significantly while estimates of the time available to move these forces decreased. These changes placed a premium on speed and they in turn altered mobility planning by requiring more emphasis on both prepositioning and airlift. In addition, non-NATO contingency planning estimates were also changing. Recognizing the Free World's dependence on Persian Gulf oil and increased Soviet activity outside the Soviet bloc, US planners shifted more of their attention to Southwest Asia. These dramatic shifts in priorities highlighted the need for a capability to project US combat power rapidly worldwide. To evaluate the impact of these improved estimates and shifts in priority, the Defense Authorization Act of 1981 directed a study detailing overall US mobility requirements. The resulting Congressionally Mandated Mobility Study (CMMS) concluded that rapid deployment in support of US force projection strategy was essential and that major increases in airlift capability were required.

Despite recent increases in spare parts and the number of aircrews, plus the planned acquisition of C-5Bs, KC-10s, Civil Reserve Air Fleet (CRAF) Enhancement, and C-19s, programmed intertheater airlift capability will still be far short of the CMMS minimum recommendation.

While the Nation's airlift capability includes a significant and cost-effective contribution from the CRAF, the commercial airlines today face a competitive economic environment and are moving toward smaller aircraft. Because of this, it is highly unlikely that the contribution of civil cargo-capable aircraft will increase; in fact a decline may occur in the years to come. In addition, civil aircraft dependence on large, well established airfields limits potential CRAF contributions. Therefore, additional organic military airlift capability is necessary.

INTRATHEATER REQUIREMENTS AND CAPABILITIES

The need for intratheater airlift is much more difficult to measure than the intertheater requirement. Each potential scenario within a theater produces a different air movement requirement. The existing transportation network, the distances between bases, the size and type of forces, and the degree of disruption to normal services are some of the factors that determine the airlift requirements within a theater.

In some areas, such as Southwest Asia, the intratheater movement will depend more heavily on airlift because the rail and road networks have a limited capability and are particularly susceptible to enemy interdiction. Our C-130s, however, are inadequate, both quantitatively and qualitatively, to support the logistical deployment, employment, redeployment, and resupply requirements. In scenarios requiring a large movement of forces, the transfer of cargo from intertheater aircraft to intratheater aircraft causes airfield saturation at main operating bases and results in delayed delivery. While programmed mobility enhancements in airlift, sealift and prepositioning will increase the amount of cargo delivered to the theater, these enhancements, in turn, will require more intratheater movement to distribute the intertheater increase.

The quantity of people, equipment and supplies to be delivered determines only a portion of the airlift requirements. Delivery where and when needed is equally important. Speed, flexibility and efficiency demand airlift aircraft with specific characteristics.

REQUIRED DESIGN CHARACTERISTICS

Speed is the key advantage of airlift. To fully exploit the advantages of speed, an airlift aircraft should have the following design features:

First, the aircraft should be capable of carrying all of the equipment and supplies required to project and sustain combat forces during the early days of a conflict. The cargo compartment should be efficient (i.e., its dimensions must be properly balanced with allowable payload). Such a balance would accommodate large, high density items such as outsize infantry/cavalry fighting vehicles; large, low density items such as outsize helicopters; medium size items such as oversize trucks; and bulk supplies shipped on pallets.

Second, the aircraft should be able to deliver substantial payloads to the principal theaters; thus it must have intercontinental range and be air refuelable. Air refueling allows continued operation when foreign support or overflight rights are denied. Selective overflight, allowed by air refueling, also has the potential to reduce ramp saturation at enroute staging bases.

Third, to meet user requirements, the aircraft should be designed to airdrop troops and deliver equipment by airdrop, low altitude parachute extraction system (LAPES) or other extraction methods.

Fourth, the aircraft should be designed to survive in a hostile environment. Design features should incorporate redundancy, separation, maskings/shielding of essential components, armor, damage tolerant design, and isolation of hazardous elements in addition to the performance capability necessary to significantly reduce the time and airspace used to perform the mission. Ground maneuverability with rapid on and off load capability is essential. The ability to accommodate electronic countermeasure equipment must also be considered.

These characteristics, with the exception of outsized LAPES, are met to some degree by our existing airlift fleet. However, experience with the current fleet and a detailed analysis of the environment anticipated in global scenarios dictate two additional and critical characteristics: a high degree of airfield compatibility and a minimum cost to own and operate. When the designs for the C-141 and C-5 were conceived in the 1960s, the technology to fully exploit these capabilities did not exist. Today, however, the state-of-the art in aircraft design does permit fulfillment of what have now become pressing military necessities.

Airfield Compatibility

Discussions concerning airfields usually center around the dimensions of the runway (length and width). If the runway is too narrow or short, other factors are meaningless. But when length and width are adequate, the total environment must be studied in detail. Taxiways, ramp space, obstructions and weight bearing capacity must all be considered when evaluating airfield compatibility.

A summary of all non-US Free World airfields is presented in Table 1. This shows the significant increase (nearly a factor of two) in additional airfields available for each thousand feet reduction in runway required. Obviously it would be desirable to specify the minimum possible runway requirement for an airlifter, say 2000 feet or less, but this would dictate design features that might compromise other phases of the mission. Studies have shown that the ability to routinely operate into runways 3,000-4,000 feet long provides significant operational flexibility yet still permits an efficient, state-of-the-art design. Runways 3,000-4,000 feet long are typically about 90 feet wide. Additionally, the runway's supporting environment usually includes a limited number of narrow taxiways and restrictively small parking areas. For example, in West Germany the typical small, austere airfield is 3,000-4,000 feet long (paved), 98 feet wide, has narrow taxiways (40-50 feet), and limited parking area (50,000 square feet). In Saudi Arabia, the runways at typical austere fields are 3,000-5,000 feet long (unpaved or semiprepared), 80-150 feet wide, with no taxiways and no defined parking areas. In Korea, many runways are 2,500-5,000 feet long (paved), 80-110 feet wide, have no parallel taxiways or turnaround areas, and have only limited parking areas (110,000 square feet). Aircraft operating in these theaters must have the characteristics to operate routinely and safely through restrictive and crowded airfields.

AIRFIELD SUMMARY TABLE

RUNWAY LENGTH X WIDTH	AFRICA	CENTRAL EUROPE	SOUTH AMERICA	MIDDLE EAST	FREE WORLD LESS US
≥5,000 X ≥ 150	201	56	157	144	1,576
≥5,000 X ≥ 90	641	247	535	393	3,488
≥4,000 X ≥ 90	1,059	294	1,182	480	5,640
≥3,000 X ≥ 90	1,902	436	2,837	586	9,887
≥2,000 X ≥ 90	2,702	710	4,855	640	15,165

Table 1

Even in well-developed regions, there are few airfields capable of accommodating a heavy flow of the large transports currently in the inventory with their limited ground maneuverability. Possible runway interdiction and the need to bed down reinforcing fighter and combat support units further reduce this number. As a result, the potential for an airlift flow being restricted by airfield saturation becomes a major factor. Also, in certain areas of the world such as the Middle East, Africa and South America, the limited number of major airfields 14uld have a significant impact on the time required to deliver a force into combat, especially if airlift flow into that airfield must be restricted or if a long overland march is required from the offload base to the battle area.

As a specific example, the Saudi Arabian airfield system has a total of 99 airfields with a hard surface runway. Of these, 20 are not suitable for current airlift operations because they are too short or too narrow. Sixty have limited parking ramps and narrow taxiways. The remaining 19 are considered adequate for C-5 and C-141 operations. Further, in the Federal Republic of Germany, there are only 18 airfields with sufficient ramp space to handle aircraft the size of 747s and C-5s. Of these airfields, six account for approximately 84 per cent of that ramp space. Frankfurt alone accounts for approximately 40 per cent of the total. The loss of any one of these, particularly Frankfurt, would have a major impact on operational flexibility and the flow of cargo of all types into Central Europe. The airlift system must have an option to divert to a nearby base to ensure that a unit can be delivered or resupplied with minimal disruption should a key base become disabled, congested or lost to the enemy.

Life-Cycle Cost

An evaluation of alternative weapon systems must consider not only mission effectiveness, but also cost effectiveness. A commonly used measure of cost effectiveness is the life-cycle cost of systems having like capabilities. Historically, the largest portion of a system's life-cycle cost has been the cost of operating and supporting the system once it is put into service. The operations and support (O&S) area, therefore, provides the greatest potential for reducing total life-cycle cost.

Reliability, maintainability and availability (RM&A) impact significantly on O&S costs. Modernizing the airlift fleet using state-of-the-art design and construction techniques with warranted assurance of attaining RM&A standards represents a sound approach to obtaining an affordable airlift system. Such an approach will not only save money but can reduce manpower requirements as well. Although personnel costs are included in life-cycle O&S costs, manpower ceilings further constrain any growth in manpower necessary to support the airlift force.

Another important factor in controlling costs is the size of the total airlift force. The dollar costs and economic ramifications of air base activations,

be avoided b

deactivitions and facility construction can best be avoided by maintaining a force lane and unit structure comparable to that of the active and reserve airlift units of today. The impact on Air Reserve Forces (ARF) due to aircraft or mission changes will be minimal since existing personnel and facilities can be adapted with little turbulence.

MODERNIZATION REQUIREMENTS

The current airlift force is old and technologically dated, especially in view of advances made over the last two decades. Growing O&S costs are a major symptom of aging aircraft and illustrate the need for modernization. These increased costs are largely a function of the higher costs for personnel necessary to maintain technologically obsolete systems, increased spare parts requirements, and the dramatic increase in the cost of obtaining spare parts. We must address the question of technological obsolescence and the growing costs (personnel and dollars) of making repairs and obtaining spare parts.

Military aircraft, unless produced in great numbers, create a limited demand for spares. The cost for those spares, especially those not having a market in the civil sector, has escalated dramatically. In the mid-1960s, the parts were state-of-the-art and readily available; today they are in many cases unobtainable. This has led to an industry search for alternatives available on short notice to maintain this unique Air Force equipment. These kinds of solutions have tended to be extremely costly.

By 1990, the average age of the C-141B fleet will be over 20 years, and the early C-130 aircraft will be 33 years old. Aircraft structural fatigue considerations, coupled with 1950's and 1960's technology in avionics, design and support, will make it increasingly expensive to continue to operate many of these aircraft beyond the mid-1990s. Transferring some of the C-141s to the ARF will permit lowering their peacetime utilization rate and, therefore, extend the useful life of the aircraft. The C-17 can absorb the lost intertheater capability as we retire these aircraft and, at the same time, increase our intratheater capability.

Table 2 shows the total number of aircraft and what the average age of the airlift fleet will be in 1990.

AGE OF AIRLIFT AIRCRAFT

	Aircraft Type	Number	Average Age in 1990
Intertheater	C-141B	268	24 years
	C-5A	77	19 years
	C-5B	50	3 years
Intratheater	C-130A	113	33 years
	C-130B	84	30 years
	C-130E	277	25 years
	C-130H	89	12 years

Table 2

FUTURE REQUIREMENTS

The Nation must be prepared to respond to both anticipated and unanticipated threats. To counter potential threats to our national interest, the Army is enhancing maneuverability and rapid response. Army Field Manual 100-5, "Operations," defines the new Army doctrine for fighting the AirLand Battle. On this extended battlefield, the Army must maneuver rapidly and be able to strike deeply. Ground commanders will employ the basic concepts of the AirLand Battle doctrine: initiative, depth, agility and synchronization. Battlefield mobility, deep attacks and maneuver to exploit enemy weaknesses in a sophisticated electronic threat environment are critical to success. In addition, Army requirements projected for the 1990s and beyond strongly indicate a need to increase our intratheater airlift capability for outsized firepower items such as Bradley fighting vehicles, self-propelled artillery, helicopters, and the Sgt York Division Air Defense weapon.

Today's Army units must rely almost exclusively on sealift for intertheater transportation. Efforts to lighten these units and field other more airtransportable light divisions could significantly increase the need for responsive (multimission capable) airlift. To achieve the required battlefield mobility, the Army needs increased airlift support, including outsize capability, to deliver them as close to the objective area as possible.

C-X REQUIREMENTS

The request for proposal (RFP) for the C-X weapon system solicited proposals for an aircraft capable of meeting the following capabilities/characteristics:

- Intercontinental and theater delivery of the full range of Army and Marine Corps equipment
- Operations through a 3,000-foot runway
- Ground maneuverability to permit routine operations through small austere airfields
- Airdrop of troops and equipment
- Enhanced survivability
- Excellent reliability, maintainability and availability
- Low life-cycle cost

The discussion of current airlift requirements in this report makes clear that the C-X RFP requirements remain valid today and for the foreseeable future. Our goal was to address deficiencies in overall airlift capability as well as aircraft characteristics/performance. The new operational concepts made possible by the C-17 and the specific design features of the aircraft will provide the nation with a capable, responsive, cost-effective airlift system for the future.

PART II

CONCEPTS AND DESIGN

AFFORDABILITY

The Air Force Airlift Master Plan calls for the acquisition of 180 primary aircraft authorized (PAA)[3] C-17s. This force structure will not only meet the CMMS recommended level, but will also provide a potential increase in intratheater capability of 78 per cent, modernize the airlift force, and enhance operational flexibility by adding adequate outsize intratheater airlift and outsize airdrop. With its low manpower and O&S costs, the C-17 will minimize life-cycle costs for this capability and will provide the most affordable solution to our airlift needs.

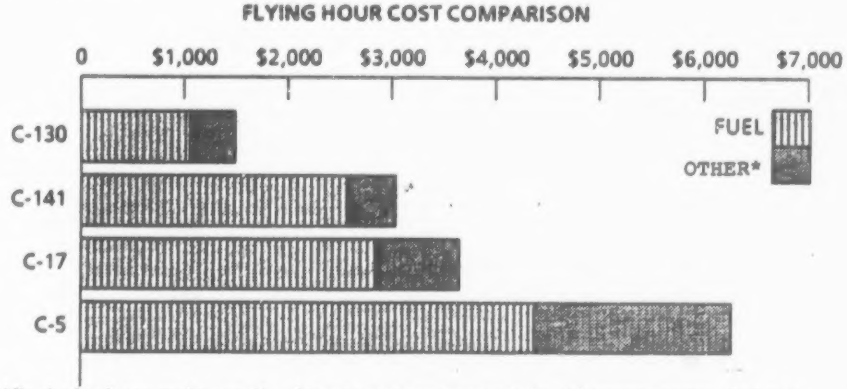
The Airlift Master Plan examined in detail various force structures to meet recommended levels of inter and intratheater airlift capability. Both existing and new aircraft were incorporated into the study to most efficiently utilize the unique characteristics of each aircraft type within the total airlift system. This in-depth analysis clearly showed that the C-17's inherent flexibility to perform both the inter and intratheater missions would produce significantly reduced life-cycle cost, particularly in manpower, over any multi-aircraft solution examined. Other multiple aircraft solutions based on future conceptual aircraft might address all of the requirements but would also involve extensive research and development costs. In addition, any delay in procurement of additional airlift aircraft past the mid-1990s will result in a loss of capability due to the necessary retirement of part of our C-141 and C-130 forces. Such a delay could push the solution to the nation's airlift shortfall into the twenty-first century. The C-17 provides a timely single aircraft solution to the needs of our airlift system.

The C-17 has been specifically designed to minimize life-cycle costs. The C-X source selection, won by the C-17, used system life-cycle cost as a primary selection criterion. A major portion of the C-17's life-cycle cost advantage stem from its low operating and support costs.

OPERATING AND SUPPORT (O&S) COSTS

Many features have been specifically incorporated into the C-17's design in order to minimize its operating costs, maintenance and supply costs, and scheduled maintenance requirements.

Operating Cost: C-17 cost per flying hour will be comparable to that of the C-141B, even though the C-17 will deliver almost twice the payload of the C-141B. The C-17's low fuel consumption will contribute significantly to its low operating costs. The C-17's fuel efficient engines, advanced technology wing, winglets, and low drag design produce fuel consumption rates only slightly higher than that of the C-141B. Fuel costs and operating costs per flying hour for the C-17 and the current airlift aircraft are presented in Figure 1.



*(Includes base main supply, depot maintenance, replenishment spares, only.)

Figure 1

Maintenance and Supply Cost: Reliability and maintainability have been designed into the C-17. The simple design of the C-17 structure and subsystems reduces both maintenance and supply requirements. In the cockpit, modern displays reduce the number, type and complexity of instruments and displays. In addition, the C-17 makes maximum use of interchangeable parts to reduce supply requirements. These design improvements will enhance reliability and reduce the time required for maintenance.

Designed-in accessibility also simplifies maintenance and reduces the time necessary to perform maintenance tasks. Virtually all avionics (except antennas) are accessible inside the aircraft in a walk-in avionics bay below the flight deck. Stand-up room in the landing gear areas gives access to all brake and landing gear hydraulic actuators. Nearly half of the aircraft's exterior access panels and doors can be reached from ground level, thereby greatly simplifying routine inspections. Use of a quick engine change adapter, in conjunction with an engine positioning trailer, will enable a four-man crew to remove and install a new engine in less than four hours.

Maximum use of built-in-test (BIT) features will reduce maintenance troubleshooting and fault isolation time. Incorporating these test functions into the aircraft systems also reduces the amount of required external test support equipment. BIT functions are incorporated throughout the aircraft to monitor engines, air conditioning, hydraulics, wheels and brakes, antiskid, pneumatics, electrical power generation, fuel systems, and all avionics systems. BIT status can be displayed on individual system indicator panels, on cockpit displays for all communications and digital data bus systems, and on a maintenance monitor panel located at the entrance to the cockpit. This use of decentralized BIT systems avoids the maintenance and support requirements of a single, central status monitoring system.

Incorporating modern, state-of-the-art subsystems into the C-17 design takes advantage of the high reliabilities proven on the new generation of commercial transport aircraft. The schedule for the C-17 research and development program allows it to take optimal advantage of the latest commercial aircraft developments. The C-17 avionics will incorporate the latest advances in digital computer hardware and software, similar to the systems currently in use on the DC-9-80, Boeing 757 and Boeing 767. By the time the C-17 design drawings for parts fabrication are released in late 1988, the Boeing 767, the newest commercial design, will have accumulated over 3 years of operational experience. The Pratt and Whitney PW2037 engine will be proven in over 3.5 million hours of commercial service on the Boeing 757 before its first flight on the C-17. Also, use of a commercial FAA certified engine avoids the high cost of maturing a new engine and opens the possibility of competitively using commercial depots for engine maintenance and repair, thereby further reducing Air Force costs and manpower requirements.

Scheduled Maintenance: The reliability centered maintenance concept for the C-17 calls for significant reductions in scheduled maintenance compared to existing airlift aircraft. In-depth and extensive periodic depot-level inspections have been replaced with an expanded home station check. This inspection strategy minimizes aircraft down times for scheduled maintenance, reduces man-hours, lessens facility and equipment requirements, and allows increased operational use. It reduces the need for highly qualified, experienced specialists to accomplish major repairs at the field level and also reduces capital outlays for special tools, work platforms, support equipment and materials.

These C-17 design features result in dramatically lower O&S costs. The Airlift Master Plan analysis found a $17.8 billion O&S savings in FY82 dollars ($16 billion net savings) over a 30-year life cycle for the recommended C-17 force structure as compared to an alternate, two-aircraft solution.

To insure that the C-17 achieves the low support costs that result from these design features, the C-17 contract contains unique warranty provisions with specific reliability, maintainability and availability (RM&A) parameters for the completed weapon system.

RM&A PERFORMANCE

	C-X RFP REQUIREMENT	C-17 WARRANTED PERFORMANCE	C-17 GOAL
System Mission Completion Success Probability	92%	93%	97%
Air Vehicle MTBM (Flying Hours, Corrective Maintenance)	.75	.78	.86
Air Vehicle MTBM (Flying Hours, On-equipment Inherent Malfunctions Only)	1.55	1.61	1.78
Air Vehicle MTBM (Flying Hours, Mean Time Between Repair)	2.5	2.8	3.1
Maintenance Man-Hours Per Flying Hour (Air Vehicle)	20.0	18.6	17.0
Mean Man-Hours to Repair (Air Vehicle)	6.25	7.35	6.71
Full Mission Capable Rate	65%	74.7%	75.9%
Partial Mission Capable Rate (Flying Rate)	75%	82.5%	83.7%
Maintenance Downtime Per Sortie (Hours)	6.0	5.7	5.4

Table 3

Table 3 shows the RM&A performance levels specified in the C-X Request for Proposal (all of which exceed the RM&A performance of all three current MAC airlift aircraft), the levels guaranteed by the C-17 contract, and the desired goals. Should the C-17 fail to achieve any of the warranted values, the contractor must provide corrective action at no increase in contract price. To encourage the contractor to exceed these values, the contract includes a $12 million incentive payment for exceeding the desired goals.

In addition to the RM&A guarantee, the C-17 contract requires the contractor to correct any structural defects detected during 45,000 hours of durability testing. The contractor must also replace (at a pro rata price) specified airframe and landing gear components that experience repetitive failures. The airframe components on each aircraft are warranted for 10 years or 10,000 hours, and landing gear components for 10 years or 20,000 landings. The unique warranty provisions in the C-17 contract will greatly improve the likelihood that the C-17 weapon system achieves its planned life-cycle costs.

MANPOWER

Although manpower costs are included in O&S costs, the issue of manpower requirements is so important that it must be considered separately. The future airlift force structure must have manpower requirements compatible with both the demographic pressures that will reduce available manpower and the budgetary pressures that will limit the manpower growth available to the US military.

The C-17's low maintenance requirements, as reflected in the warranted RM&A performance levels, will result in low requirements for maintenance manpower. Despite the C-17's higher planned wartime objective utilization rate, maintenance manning requirements for the C-17 will be comparable to that of the C-141.

The C-17's 3-person aircrew size will result in low aircrew manpower requirements as well. The C-17's cockpit design will permit operation by a flight deck crew of only two pilots, similar to modern commercial transport aircraft. The cargo compartment has been designed for operation by a single loadmaster. Therefore, despite the higher wartime utilization rates and higher crew ratios per aircraft, the C-17 will have the lowest aircrew requirement of any large military airlift aircraft in service.

Table 4 presents the MAC estimates of what the CONUS manpower requirements would be for a 16 PAA squadron of C-5, C-17 and C-141 aircraft.

PROJECTED MANPOWER REQUIREMENTS FOR A 16 PAA
SQUADRON (ACTIVE AND RESERVE ASSOCIATE)

	C-5	C-17	C-141
AIRCREW	480	240	392
MAINTENANCE	1,625	951	761
OTHER	311	217	207
TOTAL	2,416	1,408	1,360

Table 4

It should be noted that the C-17 squadron manning shown will support a utilization rate of 15.65 hours per day while the C-141 utilization rate is 12.5 hours per day. Considering this and the higher average payload of the C-17, the 3.5 per cent increase in personnel for a C-17 squadron (48 manpower positions) over a C-141 squadron is more than offset when considering the C-17 will provide more than twice the airlift capability.[4]

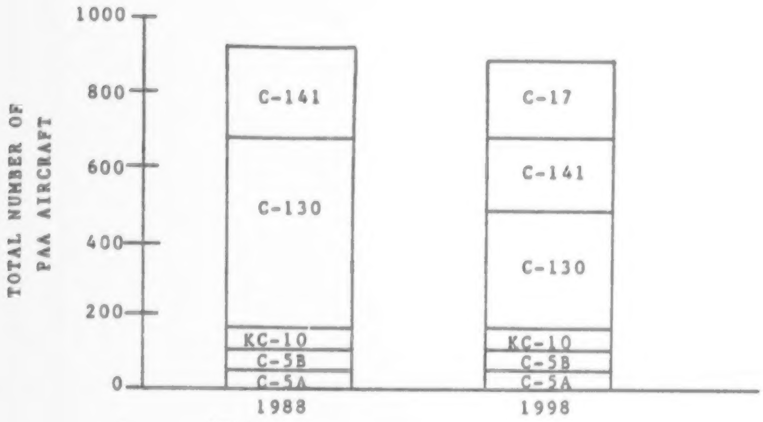
FORCE STRUCTURE - A SYSTEM PERSPECTIVE

The Air Force developed the C-X concept to address shortfalls in total airlift capability and to correct problems and inefficiencies in the airlift system. The C-17 is the best aircraft to meet force structure and modernization needs because its concepts are founded on a system perspective of correcting deficiencies in both the intratheater and intertheater roles.

PROPOSED FORCE STRUCTURE

The Air Force has developed a concept in which one aircraft, the C-17, can satisfy intertheater airlift needs, support intratheater requirements, meet the essential need to modernize the aging fleet with a current technology aircraft, and provide the framework for attaining the needed airlift within reasonable cost and manpower limits. The total numbers of PAA aircraft in the airlift force are shown in Figure 2. The 1988 force incorporates programmed procurement of C-5Bs and KC-10s. The 1998 force shows that the total number of aircraft decreases slightly (54 fewer aircraft), but results in an increase in overall airlift capability.

TOTAL PROPOSED FORCE STRUCTURE



FORCE STRUCTURE FEATURES

- Retires 180 PAA older C-130s.
- Retires 54 PAA C-141Bs as they reach the end of their useful life.
- Transfers some C-141Bs to the ARF.
- Acquires 180 PAA C-17s.
- Retains 114 PAA C-5s.
- To comply with total force policy objectives, this force structure will contain a force mix of C-5s, C-141s, C-17s, and C-130s in the active Air Force, Air National Guard, and US Air Force Reserves.

Figure 2

DIRECT DELIVERY

The objective of an airlift system is to place forces and supplies when and where they are required. When the delivery can be made in one step without transshipment, this is called direct delivery. The concept of direct delivery is a product of the aircraft, the available landing areas, and a capable command and control system.

Characteristics of the aircraft which enhance direct delivery include the ability to carry the full range of the deploying forces equipment over long distances, the capability to operate into small landing areas and use minimal ramp space, ease of offloading without sophisticated ground equipment, and high reliability. Since direct delivery is a relative term, any aircraft is capable of direct delivery to some degree. Rather than concentrate on the characteristics of any one type aircraft, greater concern should be given to the direct delivery capability of the entire airlift fleet. For example, CRAF aircraft can direct deliver bulk and oversize cargo to major airfields. The C-5 and C-141 extend the capability to deliver forces into less well established fields. The C-17 will offer an even greater extension of the direct delivery concept by combining intercontinental range, outsize capacity and the ability to use C-130 type airfields.

The important point is that the enhanced capabilility of the C-17 benefits the other aircraft in the fleet by reducing competition for limited ramp space at larger airfields. Matching force types and required destinations with the appropriate aircraft enhances the effectiveness of the air transportation system.

The primary benefit of direct delivery is the reduction in the required time to deliver combat units to the battle. It eliminates some of the need for transshipment and thereby saves the time associated with ground handling and awaiting further transportation of these loads. Direct delivery also reduces the time required for ground transportation from the offload airfield to the final destination. Time savings realized from direct delivery will vary due to differences in loads, distances and operational constraints for each mission. For example, the CMMS estimated that direct delivery could result in a 7-15 per cent improvement in unit closure time for a Southwest Asia deployment.

Direct delivery missions will also reduce congestion at main operating bases[5] (MOBs). Each mission that goes directly to a destination airfield reduces transshipment requirements at the MOB. With fewer deliveries into the MOB, the demand for intratheater movement is lowered, resulting in a reduced requirement for support personnel and equipment.

The direct delivery characteristics of the C-17 offer an important additional advantage. The C-17 will comfortably operate in the intratheater role traditionally reserved for the C-130. Although the C-17 has a much greater capacity, it will not replace the C-130 for the sortie intensive, relatively low tonnage resupply missions that must be flown. It will, however, ease the pressure on the C-130 fleet by augmenting it when the situation justifies the larger capacity, such as for bulk ammunition or fuel supply, or the longer range intratheater missions typical in areas such as Southwest Asia.

CASE STUDY

Exercise AHUAS TARA 83, a combined US-Honduran exercise held in January and February 1983 showed how the enhanced direct delivery capability of the C-17 could have more effectively deployed the required exercise forces. The potential efficiency of the C-17 in this exercise is not the only militarily significant observation. Of more importance is the realization that, if a much larger force had been required, the combined efforts of the existing C-141 and C-5 fleet and the programmed C-17 would have allowed a much more rapid build up by matching the airplanes with the available airfields. AHUAS TARA was small enough to accept an inefficient use of airlift resources. A conflict in SWA, Korea or Europe would be an entirely different situation. Large scale airlift inefficiencies without direct delivery capability in those areas could severely impact our ability to deploy and resupply combat forces.

Figure 3a illustrates the deployment of forces in AHUAS TARA 83. The destination airfield at Puerto Lempira was unsuitable for C-141 or C-5 operations because of runway length, runway composition and available ramp space. As a result, the C-141 and C-5 deployment payloads had to be transshipped by C-130 to Puerto Lempira from La Mesa, 240 nautical miles (NM) away. Thirty-two C-141 missions delivered 819.1 tons of cargo and 533 passengers to La Mesa. These payloads were then delivered to Puerto Lempira by 160 C-130 sorties to complete the deployment phase. Two C-5 missions delivered 92.1 tons of cargo, primarily UH-60 Blackhawk helicopters in an outsize, combat-ready configuration, and 105 passengers to La Mesa. From La Mesa, the helicopters flew to Puerto Lempira. In addition, during the employment phase of the exercise, the C-130s moved 1,803

Honduran troops (347 airdropped) and 127.5 tons of cargo from Honduran bases to Puerto Lempira. C-130 support for the employment and deployment phases totaled 232 sorties (including positioning and depositioning sorties).

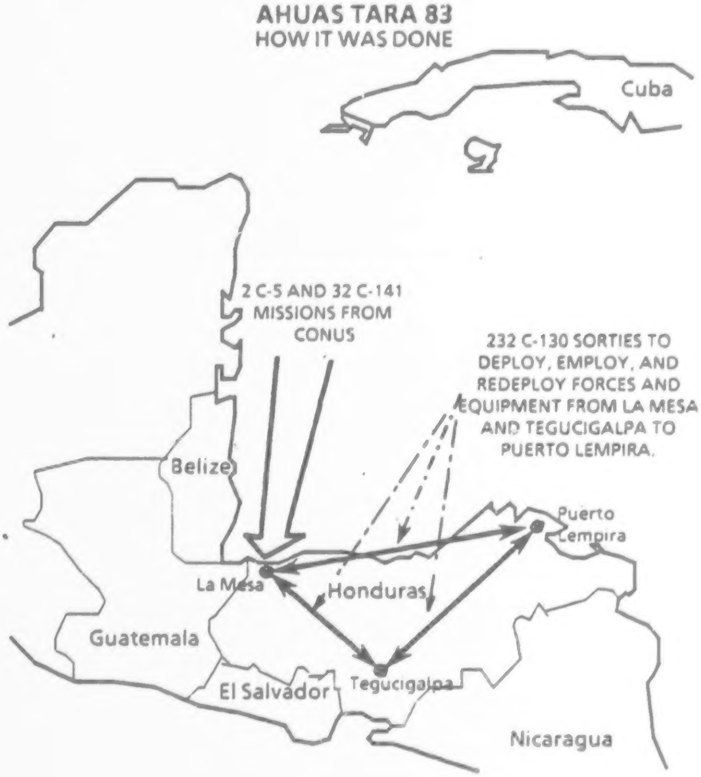
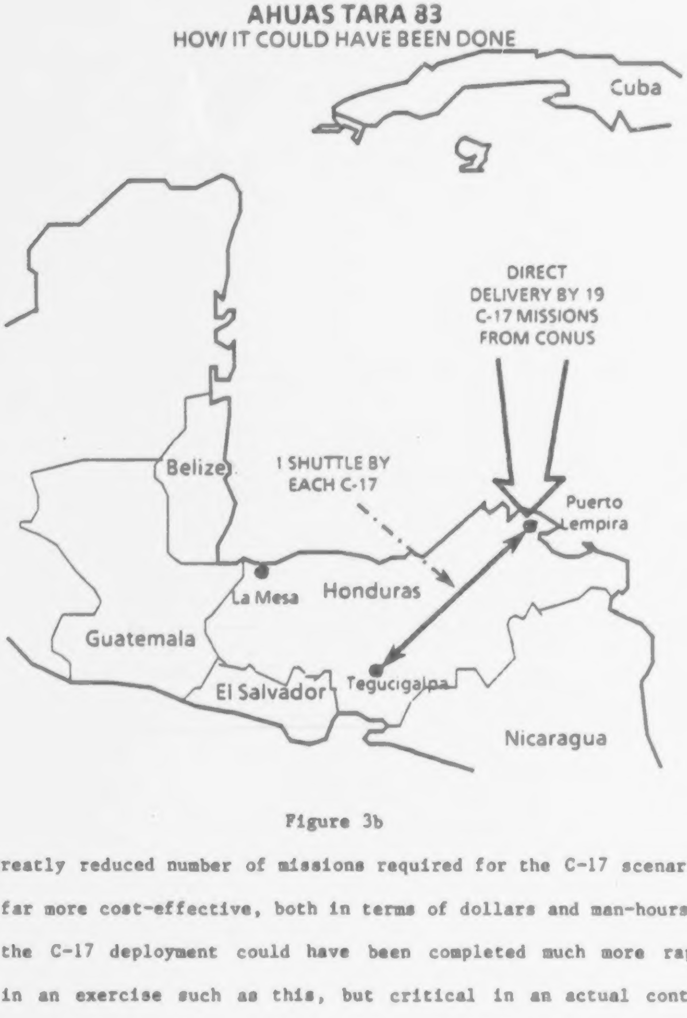

AHUAS TARA 83
HOW IT WAS DONE
Cuba
2 C-5 AND 32 C-141
MISSIONS FROM
CONUS
232 C-130 SORTIES TO
DEPLOY, EMPLOY, AND
REDEPLOY FORCES AND
EQUIPMENT FROM LA MESA
AND TEGUCIGALPA TO
PUERTO LEMPIRA.
Belize
Puerto
Lempira
La Mesa
Honduras
Guatemala
El Salvador
Tegucigalpa
Nicaragua

Figure 3a

Figure 3b illustrates the same exercise with the C-17. By direct delivery, the C-17 could have completed the same deployment in only 19 missions, flying directly from CONUS bases to Puerto Lempira. In doing so, it would have delivered the outsize helicopters directly into Puerto Lempira, eliminating the 240 NM ferry flights. Adding an intratheater shuttle, from Puerto Lempira to a Honduran base and back to Puerto Lempira, each of these C-17 missions could have delivered all of the Honduran forces, including the airdrop. Such a C-17 operation would have required no beddown of C-130s in the theater and eliminated the need for support personnel and equipment at La Mesa and Tegucigalpa. It also would have eliminated the requirement for a MOB at La Mesa, thereby eliminating the need for en route maintenance and aerial port support at that airfield.


AHUAS TARA 83
HOW IT COULD HAVE BEEN DONE

Cuba
DIRECT DELIVERY BY 19 C-17 MISSIONS FROM CONUS
Belize
1 SHUTTLE BY EACH C-17
Puerto Lempira
La Mesa
Honduras
Guatemala
El Salvador
Tegucigalpa
Nicaragua

Figure 3b

The greatly reduced number of missions required for the C-17 scenario would have been far more cost-effective, both in terms of dollars and man-hours. Additionally, the C-17 deployment could have been completed much more rapidly -- desirable in an exercise such as this, but critical in an actual contingency.

The direct delivery characteristics of the C-17 are a product of careful requirements definition and effective engineering solutions to meet those requirements. A detailed description of the design features which directly enhance its direct delivery capabilities follows.

DESIGN FOR DIRECT DELIVERY

The C-17's unique configuration and design features give it the long range and large payloads necessary to meet intertheater requirements while retaining the short takeoff and landing capabilities and ground maneuverability performance for direct delivery.

Long Range Mission Performance: The C-17's excellent range/payload characteristics result from several key design features. The advanced technology wing design decreases aerodynamic drag and reduces structural weight, thereby reducing fuel consumption. Additionally, the greater thickness of the advanced technology airfoil provides a larger internal fuel volume. The use of winglets, proven on commercial aircraft, reduces drag and lowers fuel consumption by approximately 4 per cent. The Pratt and Whitney PW2037 engine, chosen for use on the C-17, is the most fuel efficient engine available. In addition, a full-time computerized energy/performance management system will provide the crew with continuous performance requirements for optimal fuel efficiency. These features, combined with the C-17's large payload capability, result in exceptional range/payload performance as shown in Figure 4.

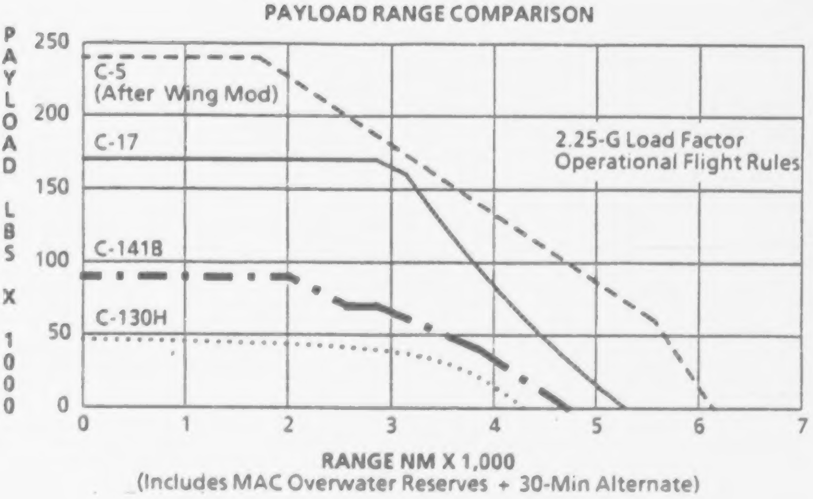


Figure 4

The C-17's payload capabilities are particularly significant in the distances between 2,400 and 3,200 NMs. These distances were identified by the C-X task force as critical for worldwide deployments. The C-17 will be able to deliver its maximum payload (172,200 pounds) over 2,800 NMs.

Shortfield Takeoff and Landing Performance: The C-17 incorporates short takeoff and landing design features that were proven in 800 flight test hours on the YC-15 prototype aircraft. The C-17's externally blown flaps are mounted directly behind the engine exhaust, which flows over and through the flaps generating additional lift. The high, forward position of the engines increases and spreads the exhaust flow over the flap and, at the same time, increases ground clearances, providing better obstacle avoidance and reduced foreign object damage potential. The C-17 also uses directed lift control spoilers, mounted on the upper wing surfaces, to improve low-speed handling. The combination of externally blown flaps and direct lift control spoilers permits approach speeds as low as 115 knots with the maximum payload and sufficient fuel for a 500 NM return. These low approach speeds, coupled with the C-17's thrust reversers and antiskid braking, result in landing distances as shown in Figure 5.

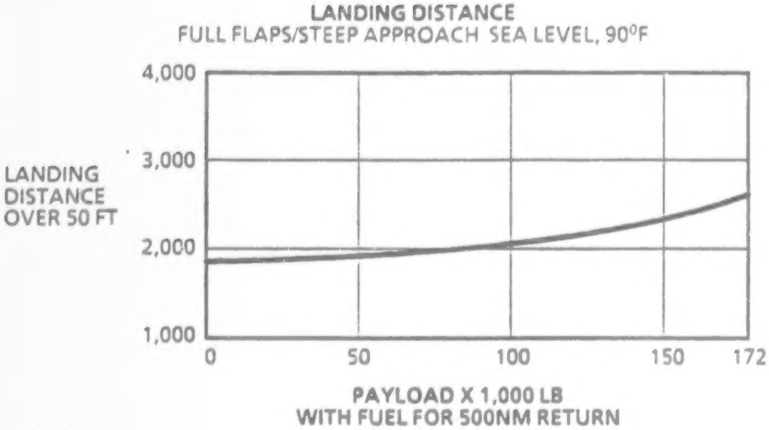


Figure 5

The C-17 incorporates a heads-up display, superior low speed maneuverability, and a high impact landing gear to allow the pilot to consistently fly to accurate touchdown points. This capability is critical in conducting safe operations when runway length is a constraint.

Ground Maneuverability: The requirement for efficient ground operations at small austere airfields heavily influenced the C-17 design. The physical dimensions of the aircraft (length and wingspan) resulted from the need to maximize the number of aircraft which could be parked on the small ramps associated with the austere airfields defined in the C-X RFP. The 165-foot wingspan and 172.5-foot length will permit simultaneous operations of two aircraft on a 250-foot by 300-foot ramp or single aircraft operations on an even smaller ramp (135-feet by 125-feet). The ground maneuverability designed into the aircraft makes it compatible with the narrow runways and taxiways typical of small austere airfields. This is illustrated in Figure 6.

AND SMALL RAMPS AT FORWARD AIRSTRIPS

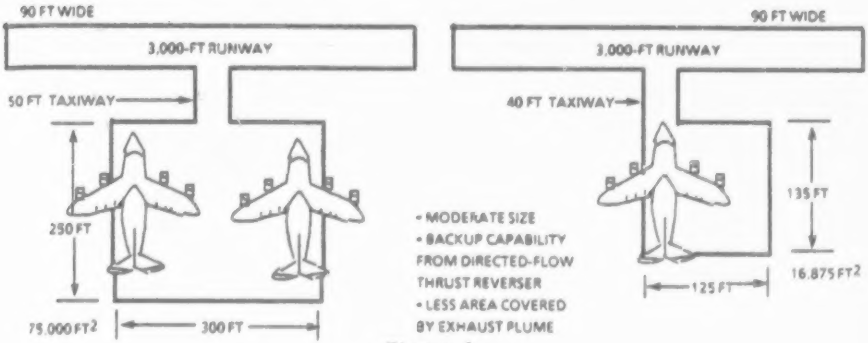

90 FT WIDE
3,000-FT RUNWAY
50 FT TAXIWAY
250 FT
75,000 FT2
300 FT
• MODERATE SIZE
• BACKUP CAPABILITY FROM DIRECTED-FLOW THRUST REVERSER
• LESS AREA COVERED BY EXHAUST PLUME
90 FT WIDE
3,000-FT RUNWAY
40 FT TAXIWAY
135 FT
16,875 FT2
125 FT

Figure 6

The C-17's thrust reversing system gives it the capability to back up routinely during ground operations. This enables the C-17 to turn around on a 90-foot wide runway and greatly reduces the ramp space required to taxi and park. Although the majority of operations will be from paved runways, the C-17 will be capable of operating from unpaved, semiprepared, compacted surfaces such as sandy clay or gravel, even with the heaviest payloads. The engine exhaust flow, when reversed, is all deflected upward, minimizing dust and debris and eliminating interference with ground personnel and equipment. This is shown in Figure 7.

GROUND OPERATIONS
CLEAR OF ENGINE BLAST

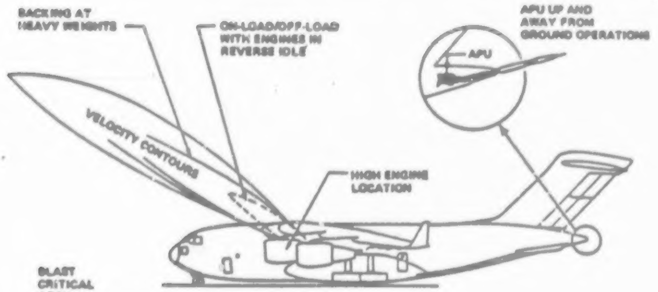

BACKING AT HEAVY WEIGHTS
ON-LOAD/OFF-LOAD WITH ENGINES IN REVERSE IDLE
APU UP AND AWAY FROM GROUND OPERATIONS
APU
VELOCITY CONTOURS
HIGH ENGINE LOCATION
BLAST CRITICAL AREA
PULL IN, BACK OUT

Figure 7

COMPATIBILITY WITH THE FULL RANGE OF ARMY EQUIPMENT

The C-17 will not only modernize the airlift force, but will also meet our requirement to carry the full range of Army equipment either between theaters or within a theater of operations. The C-17 cargo compartment will provide the capability to deliver outsize cargo and will permit double row (side-by-side) loading of the oversize pieces which make up the bulk of the Army equipment. For example, two 5-ton trucks can be carried side by side in the C-17. This capability reduces the number of sorties required to move a unit by allowing the cargo space to be used more efficiently. The large cargo ramp and door will allow straight-in loading of all equipment. Also, the cargo loading ramp will be stressed to accept the same cargo densities as the main floor. These features will give the C-17 significant operational utility and flexibility.

Figure 8 represents the double row loading of pallets and equipment.

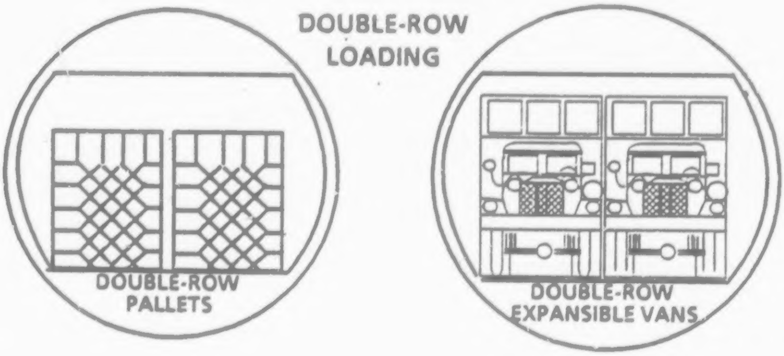


Figure 8

Figure 9 represents typical Army equipment and how it would be loaded in the C-17.

**C-17 SIZED FOR EFFICIENT LOADING
OF ARMY VEHICLES**

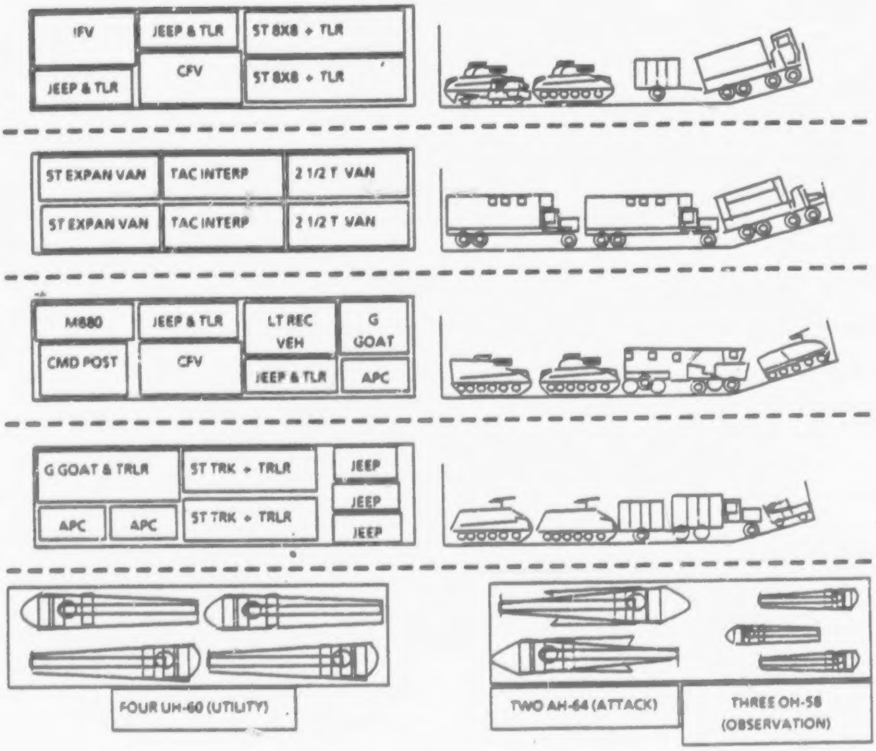

IFV
JEEP & TLR
ST 8X8 + TLR
JEEP & TLR
CFV
ST 8X8 + TLR
ST EXPAN VAN
TAC INTERP
2 1/2 T VAN
ST EXPAN VAN
TAC INTERP
2 1/2 T VAN
M880
JEEP & TLR
LT REC VEH
G GOAT
CMD POST
CFV
JEEP & TLR
APC
G GOAT & TRLR
ST TRK + TRLR
JEEP
JEEP
APC
APC
ST TRK + TRLR
JEEP
FOUR UH-60 (UTILITY)
TWO AH-64 (ATTACK)
THREE OH-58 (OBSERVATION)

Figure 9

SURVIVABILITY

Survivability will be a major consideration in the design of the C-17. A detailed vulnerability analysis (to be completed during full scale development) will determine the location and redundancy needs of critical components and structures so they can be adequately protected. Additionally, the maneuverability characteristics of the C-17 will allow it to quickly penetrate a threat environment to either airland, airdrop or LAPES. By minimizing the exposure time at low altitudes, the C-17 will be less susceptible to small arms fire and reduce the possibility of ground detection and engagement by hostile air defense systems. Space, weight and power provisions for radar warning, infrared and flare systems are incorporated in the design. Hard points on the wing for electronic countermeasures equipment are also included. The fuel tanks will have a nitrogen inerting system and all fuel lines that are one inch or greater in diameter must be self sealing. There is also space provisions for armor plating in the cockpit and loadmaster station. These design features will make the C-17 more survivable than any other airlift aircraft in the force.

The extensive work that went into developing the C-X concept defined an aircraft to increase United States force projection capability and modernize the airlift force structure to meet the challenges into the 21st century. The C-17 will meet this need by blending proven design features to provide the physical characteristics and performance allowing it to operate effectively in all phases of the airlift mission. Its resulting high productivity and supportability will provide needed airlift capability at an affordable cost. The C-17 will allow us to meet the challenges provided by an aging airlift force, projected manpower and budgetary constraints, and a global environment requiring this nation to respond quickly and decisively where our interests are threatened around the world.

NOTES

1. Outsize is defined as cargo that will not fit in a C-130/C-141 cargo compartment.

2. A small, austere airfield (also called a forward operating location - FOL) is an airfield normally operated by a non-airlift unit used as the final offload base for airlifted payloads. Such airfields range from small, austere airfields with runways as short as 3000 feet, narrow taxiways, small ramps and limited facilities, to operational fighter bases with unrestricted runways, limited (and congested) ramps, and limited support for airlift aircraft.

3. Primary Aircraft Authorized (PAA) is the number of aircraft used to compute force structure capability and is based on the total available at any time to support the mission. There are additional aircraft procured which are dedicated to training (TF) and backup/attrition reserve (BAI). BAI accounts for those aircraft unavailable due to depot maintenance or some other reason. The USAF Airlift Master Plan numbers deal only with primary aircraft authorized (PAA) because that is a realistic capability. The C-17 program plans to procure 210 total aircraft of which 180 are PAA and 30 are TF/BAI.

4. Using numbers from the USAF Airlift Master Plan, the productivity of the two squadrons in the intertheater airlift role is as follows:

	NUMBER OF AIRCRAFT		UTILIZATION RATE (HOURS/DAY)		BLOCK SPEED (KNOTS)		PRODUCTIVITY FACTOR		AVERAGE PAYLOAD (TONS)		AIRLIFT CAPABILITY (MTM/D)
C-17	16	x	15.65	x	440	x	.47	x	48.3	=	2.50
C-141B	16	x	12.50	x	410	x	.47	x	27.5	=	1.06

5. A main operating base is an airfield planned for permanent occupation in peacetime with operational facilities adequate to support its full wartime potential. Such airfields normally have an unrestricted runway environment, full-time instrument approach capability, a fully equipped air freight section, a refueling system, and a maintenance and supply complex.

LSD-41

Senator **Cohen**. Admiral Walters, we cannot let you go by without being questioned here this morning. I would like to ask you about the LSD-41's.

We have got two in the request for fiscal year 1985, which will be ships two and three of the requested three-ships/5-year program, as I recall. What would be the consequences and the impact upon the contract—the contract with Avondale has options, as I understand it—what would be the impact if we were to limit funding to one ship instead of two this year?

Admiral **Walters**. We had options for either one or two ships in the year, so that possibility was taken into account in the options that were granted in the contract. As to specifically what the prices would be, generally when you reduce the quantity the price increases somewhat, but I still think that we have a very good bid from that contractor in terms of its current contract with the options.

Senator **Cohen**. Also, about the LCAC's? We have a request for fiscal 1985 for nine LCAC's. What would be the impact on the program if we froze funding at the current level of six?

Admiral **Walters**. Well, I think the impact in the case of LCAC's would be an increase in price simply because we have had a contractor who has built facilities to build essentially 12, and I have noted that there has been some cost increase per unit cost of those craft. I think some of it is due to the fact that we are not utilizing full-plant capacity.

Inevitably, you know, we tend to pay for the capacity that is there whether it is being used or not in one form or another, so I think the reduction in the numbers not only affects our ability to attain the objective we have but might drive up the cost. It is hard to tell. I would hope not, but I am giving you an honest answer. I am afraid it would.

Let me tell you what my problem is. As I look at the funding for this year for force projection programs, 72, almost 73 percent of force projection funds are contained in six major programs. We have the C-5B, which I doubt is a multiyear funding program at this point; right?

General **Ryan**. It is not.

Senator **Cohen**. I doubt whether you would want that to be altered in this year's budget. The KC-10's—I assume you want to keep those. You have the LAV's, which we have not really talked about, General, whether you need the full complement of the LAV's. I assume that you do and you would not want to see that program injured.

That does not leave much. We have the LSD-41's. We have the C-130 modifications, and we have the LCAC's. And if this subcommittee is forced to absorb some of the reductions, I just need to know exactly what the priorities are going to be as far as you gentleman are concerned.

[No response.]

[Laughter.]

Let the record indicate there was a gasp.

Senator **Wilson**. Don't all speak at once. [Laughter.]

Senator **Nunn**. I want to read the record on that one.

Admiral **Walters**. Well, I can only answer the question from the Navy's point of view. It is our job to tell you what our requirements are to do the job. We have done that. As General Glasgow has mentioned, for the first time we agree upon what we need. We recognize the economics and, for example, in the contract for the LSD, that potential for an option of one is there so that does not disrupt our multiship contract arrangements.

We prefer not to lose it, and the same thing is true of the LCAC's. The LCAC can be produced in any number. Characteristically, when you reduce the numbers, the price goes up. And so that is the choice you have to make.

General **Ryan**. From the standpoint of the Air Force, Mr. Chairman, I think I would take the view, first of all, that I would not recommend any cuts in the air mobility area. We have and have had for some time a significant imbalance between the capabilities and size of our conventional forces which form the conventional deterrent—an imbalance between those forces and the ability to move those forces to where they are needed in times of conflict.

I believe it would be shortsighted to attempt to save money to reduce the defense budget in the area of mobility when that is the low side of the balance. I think we should move toward a balanced position, and so I would not be inclined to offer any of the programs that you have mentioned for reduction.

LAV

Senator **Cohen**. General Glasgow, the LAV. You have requested $274.8 million for 292 vehicles. I assume that you need to have all of that to complete the Marine Corps procurement?

General **Glasgow**. Mr. Chairman, I have the former program manager, Col. Joe O'Brien, with me here today, who went up to Ontario with the new program manager and went through the contracting or recontracting for the unilateral effort that we now have, so, if I can, I would defer that question to him.

Colonel **O'Brien**. Good morning, sir.

Sir, in 1982, we executed a joint 5-year multiyear contract for the LAV with the Army. With the elimination of the Army from the LAV program, what we tried to do was maintain the joint contract numbers for fiscal year 1984 and 1985 in order to maintain the cost and benefits of that 5-year multiyear contract.

Senator **Cohen**. Was there any impact because the Army dropped out of that program—any impact on the unit cost?

Colonel **O'Brien**. There is a desire not to have an impact on unit cost. What the contractor would like to do is to maintain the same contract unit prices that we wrote in the contract with them in 1982, but there would be a cancellation or partial termination liability attached to the contract, which we have estimated to be somewhere in the neighborhood of $30 million.

Senator **Cohen**. I am not sure I understand. What would the contract termination——

Colonel **O'Brien**. The program was originally a 5-year mulityear contract from 1982 to 1986. In order to maintain the contract numbers for fiscal years 1984 and 1985 which fulfill the current requirements for the Marine Corps, we intend to eliminate the last year of the contract. There was no need to go to 1986. Just by the elimination of 1986 alone from the contract, just in nonrecurring fees alone, is about a $13 million cancellation liability.

Of course, with the Army termination we are buying a lesser number of LAV-25 turrets and that accounts for another $7 or $8 million in nonrecurring liability. We also incure a recurring liability of approximately $10 million because of Army termination.

Senator **Cohen**. What has been your experience to date with the LAV? You received the first units in 1983.

Colonel **O'Brien**. The first unit was activated last fall, at Twentynine Palms. That was a company-sized unit. The first battalion-sized unit will be activated the first of next month, Monday, as a matter of fact. We have already started delivering LAV-25's. We have about 14 of them off the line. We have also gone through a DT/OT-2-type of testing on other mission role vehicles—that is, maintenance and recovery, the mortar vehicle, the logistics vehicle, the command and control vehicle and also the antitank vehicle, and our experience to date has been very, very favorable. We are very pleased with what we have.

Senator **Cohen**. Thank you very much. Senator Nunn?

RAIL AND TRUCK LIFT REQUIREMENTS

Senator **Nunn**. I just want to ask the general a question. I do not know how any of you feel. How much of your intra, let us call it, lift requirement and transportation requirements are handled by rail and truck, let us say in Europe? Does anybody have a ballpark figure as to what percentage we would use in truck and rail rather than aircraft?

General **Mahaffey**. Senator, I think the ballpark figure in Europe is around 80 percent.

Senator **Nunn**. Eighty with rail?

General **Mahaffey**. With rail, heavy equipment transport and so on.

Senator **Nunn**. And in other theaters of operation you would not have that?

General **Mahaffey**. For example, in Southwest Asia you would have virtually no established lines of communication, certainly no combat service support infrastructure in the form of heavy equipment transport or rail lines, that would obviate the need for intratheater airlift. We have a different situation than in Europe.

Senator **Nunn**. I was shown the other day a demonstration of a rail car that could be taken right off the rail and hooked up to a truck without every unloading or anything and just move right on down the road. Have you seen that?

General **Mahaffey**. No, sir I have not.

Senator **Nunn**. You are not using anything like that, are you?

General **Mahaffey**. Not to my knowledge.

Senator **Nunn**. You would have less weight in the rail car because when you convert it you would not want that much weight on the highway, but nevertheless there is a changeover time of 15 or 20 minutes, no more than that.

General **Mahaffey**. A dual capability.

Senator **Nunn**. It seems to me that might be something you would want to take a look at. I will get you the information.

General **Mahaffey**. All right, sir.

AIRLIFT READINESS

Senator **Nunn**. General Ryan, back on the airlift situation, you mentioned something a minute ago that I think was interesting. I have always wondered why it was not explored more. You said that we had more conventional forces than we could possibly transport to the field of battle with our current assets, including airlift and sealift. Correct?

General **Ryan**. Yes, sir.

Senator **Nunn**. Does it really make sense to keep those forces that cannot be transported to any foreseeable area of battle in a very high state of readiness on a year-to-year basis until we get sufficient lift to be able to move them? What is the advantage? What is the top readiness rating—C–1, is that it?

General **Ryan**. Yes, sir.

Senator **Nunn**. What is the advantage of having, say, 10 C–1 divisions, say Army and Marine divisions, in this country when there is no conceivable way you could get them to the field of battle in time and in fact they could stage that readiness as you are transporting other assets?

General **Ryan**. Well, I think it important to note that while we do not have the lift capability either surface or air to move as much as rapidly as we would like, we do have a significant capability, and over time we can get those forces there—not as fast as the theater commanders would like to see to fight the threats that they see facing them under the various contingency plans, but certainly a significant amount of forces.

And, therefore, because the requirement for specific forces is not known in advance it depends very much on the fluidity of the situation.

Senator **Nunn**. But you know in advance how many you can get there. But if you have got some you cannot transport in 45 days, why maintain everything in the C–1 state of readiness?

General **Ryan**. Well, my question in return would be which do you allow to regress. That might be the unit that you need the most and need to have the capability to move a very limited number of units in a very timely manner.

Senator **Nunn**. Your question to me would assume that every unit has different, unique capabilities. That is not true. You have some units that are exactly duplicative of others, that are just alike. You have got several heavy units. You have got several light. Why not stagger your readiness based on the ability to transport?

Of course all of us want high readiness if we can get them there, but why not stagger that if we are going to have to cut in some way? Why not have an analysis that matches your readiness in this country with your sea and airlift from the point of view of getting them ready by the time you can transport them?

I'm not saying you keep them in a C–4. I am saying you gear your readiness so that that C–4 unit can be brought to C–1 by the time that C–4 unit could conceivably be shipped.

READINESS OF AIR FORCE UNITS

General **Ryan**. I will address only Air Force units and defer to my colleagues for the other forces. But in terms of Air Force units to allow readiness to decrease I think one has to look at what constitutes to decrease I think one has to look at what constitutes readiness, and even under the unit reporting themselves, the people that operate them, and their qualifications, the support for the people and equipment in terms of other pieces of equipment and spare parts.

If one allows that readiness to slip in terms of Air Force systems, it would not be practical while you are waiting for lift to become available to bring that readiness up. You would be production lead time away and recruiting and training lead time away from obtaining those levels of readiness.

Senator **Nunn**. Well, that would vary with each level of readiness, would it not? That is a pretty sweeping statement. Some of them you could bring up to date in a short time; some of them you could not. Would that not vary considerably down the list?

General **Ryan**. Absolutely. It would vary according to what it is you let slip.

Senator **Nunn**. Well, obviously you would not want something to slip that took you 150 days to get ready, if you could transport that unit in 30 days. I am talking about a very carefully synchronized inventory of what items could be brought up to date during the period of time that that unit is going to be sitting there waiting anyway because of the lack of resources.

Let me ask the Army about that.

ARMY READINESS

General **Mahaffey**. Senator, we have, de facto, a situation such as that today. Based on the forecasted availability of resources—whether it is equipment or people—we assign different authorized levels of organization to different units, basically on the basis of their deployment sequence. That is known as ALD–1, 2, or 3.

It identifies the Department of the Army fill objective for assigning people and equipment to attain and maintain a given state of readiness for that division.

Senator **Nunn**. But is that really geared to resources available to bring them up to date to readiness, or is that geared really to the transportation resources?

General **Mahaffey**. No, I was going to add that it is principally a function of what we forecast to be available in the way of Army resources. It is not precisely matched with the availability of deployment transportation assets.

Senator **Nunn**. Would it make some sense for somebody to look at that if we are going to be in a severe budget squeeze? If we have got to choose, let us say in this subcommittee, as the chairman has just implied, we may have to cut this subcommittee's budget. That means cutting resources.

Now if we have to do that, would it not make sense to have some guidance from the Department about tradeoffs between mobility and ready forces? Would not that kind of matchup make some degree of sense and, if so, is anything like that available? You have not seen a study that says to you gee, it is crazy to have 10 divisions sitting over here with the goal of C-1 depending on resources available and we cannot get anywhere near that over to Europe or Korea in any kind of conceivable time.

General **Mahaffey**. There have been a number of studies done along that line and they have given rise to such offsetting measures as POMCUS, prepositioning of equipment, and the efforts to create forward positioning of supplies and equipment in other regions to offset the shortfall in strategic lift.

READINESS

Senator **Nunn**. They have offset it partially, but I think you would acknowledge they have not come anywhere near offsetting the gap that exists and we still have a whole lot more units sitting over here, unless we are going to fight in Canada or Mexico—hopefully that will not occur in the near term. Unless we are going to do that, we are sitting over here basically kidding ourselves about what we can do with existing forces.

I am one of those who believes in readiness. I think we probably deplete too much in the way of readiness at the expense of that, but by the same token I have never seen from the military or from the Pentagon any kind of matchup that would correlate what readiness is realistically needed considering the lift resources we have, and by that I mean air and sea.

I have never seen that, and if it exists I would like to see it. If it does not exist, it seems to me it should, particularly when we are going to see a declining budget.

DOD SEALIFT STUDY

Senator **Cohen**. Well, along these lines, Admiral Avrit, you mentioned in your written testimony there has been a DOD sealift study. Could you tell us what the study shows and perhaps you can give us a copy of that study so we would know what it deals with in the way of augmentation requirements?

Admiral **Avrit**. Yes. Speaking now from the transportation standpoint, not the combat force readiness but from the getting there, there are three factors I think that pertain: one, the prepositioning of forces, the airlift and the sealift, that all together must move the forces to the area of operation.

The DOD sealift study has in fact reconciled all three of those factors together against the programmed force structure in fiscal year 1988 and that study is but the first step of a series. There is an ongoing intratheater study that General Ryan has referred to, and there is an extension of that DOD sealift study. It dealt primarily with dry cargo. There is an extension ongoing right now that will complete this summer that deals with POL movement.

The Navy's discounting pre-positioning. The Navy's lift commitment is 95 percent of the dry cargo that sustains a worldwide conflict and over 99 percent of the POL products, so all of those things are being reconciled against the forces, fiscal year 1988 forces, in the three studies that are ongoing.

Now PA&E in OSD has a presentation that I think they could make available and have intended in fact bringing that here to

Congress this year. I do not know what their schedule for doing that is, but they, I am sure, would be available to make that briefing of that study and the balance of those forces and what constitutes that size of requirement.

LARGE MODERNIZATION PROGRAM

Senator NUNN. I believe we have reached the point now where there is a very large modernization program going on both conventionally and in the nuclear area. In addition, there is a request for substantial increases in sealift and airlift plus the new "Star Wars" concept on strategic defense. All those programs are based on a very healthy growth rate in the defense budget. With the economy closing in on us both internationally and domestically and everyone recognizing we will have lower than planned growth rates in defense, that better recognize that some scared cows must be cut.

I know there are all sorts of reasons not to ever want to talk about some of these things, but we had better have the very best thinking of those on the inside of the building over there about innovative ways that we really can stretch our budget dollars in the most meaningful possible defense program over the next 5 years. If we do not, then we are going to have, I think, the most chaotic defense budget and picture in the next 5 years we have had in a long time in spite of increased resources.

If you fence off the strategic nuclear programs, and you fence off the new space defense program and you have a limited amount of what you can do in the manpower area—then what is left for reductions as part of the declining budget?

You fence off all the major procurement programs, as well. I think we are really kidding ourselves. My indications are that in the budget cuts coming over here there has been only a 1-year look, that everything has been looked at in 1 year rather than 3 years, yet the President's commitment in the budget cuts is a 3-year commitment, as I understand it.

If my information is correct on that—and I hope it is not—we are going to have a square pegs in round holes situation because they submit a 3-year budget commitment and the Pentagon is going through this commitment on a 1-year basis, just simply shoving it to the next year, we are really going to have a mess.

REAL GROWTH INCREASE IN DEFENSE SPENDING

Senator COHEN. If I can just pick up on that theme, you may recall last year there was a request for a 10-percent real growth increase in defense spending and a lot of us up here said that we cannot do that. We do not have enough money and we requested some guidance from Pentagon officials in making reductions.

I recall even Senator Tower, the chairman of the committee, at one point said perhaps we can get 7.5 percent, and that was rejected by DOD officials, who said that we can only have 10 percent. And what you got was something a little less than 5 by the time Congress got through with authorization. The reason I ask you the question is because we are not the experts.

You are the experts and when I point to you and say you are not going to be able to get all of these items and ask you where should we make the tradeoffs, there is great silence on the other side. If you leave it up to us, you may very well find that we cut the wrong things. And we do not have that kind of expertise and talent to do the matchups that Senator Nunn has been talking about here in the last few moments.

So we are going to need some help from the inside, and if you do not give it to us then you are going to be at the whim and caprice of those of us behind this table who do not know as much as you do about what we really need most. The fact is that we are not going to be able to have as much as we need to have.

REACHING MININUM NEED LEVELS

I recognize that you say that this is the minimum. We try to take this into account. But the reality is such that we are never going to be able to, between the House and the Senate, to come up with a level of funding that will be necessary to reach these minimum levels. So any help you can give us is going to be, I think, very important.

Senator **Nunn**. One starting point is this whole area about the matchup between lift capabilitites and resources and readiness and where we put the money. I threw that out for your thinking. I know it goes beyond your departments, but it starts there.

ARMY TERMINATION OF LAV PROGRAM

Senator **Cohen**. General Mahaffey, what led to the Army's termination of the LAV program? When I first came on the committee we started talking about LAV's, and I felt the Marine Corps ought to have the design work and have the responsibility for it, and I was told that that could not be, that we had to have the Army do a joint program.

There was quite a bit of controversy about this in 1979, 1980, and 1981, and now we find in 1984 that the Army has dropped out of the program. I am just wondering what was the rationale for that.

General **Mahaffey**. If I may, the LAV was one of a two-part, near-term response to the Army's requirement for a mobile protected gun system, basically one that would provide both fire support and antitank killing capability. We went to that interim solution in recognition of the fact that we could not acquire or bring on board a near-term single integrated system that would satisfy the need.

After having looked at the second part of that equation that involved mounting a tow antitank killing system on a wheeled vehicle, we concluded that we could not afford it on the basis of force structure costs and that it was not totally suitable for the tank-killing role.

But with that part of the equation dropping by the wayside on the grounds of nonaffordability, we were then left with the LAV-25 only, and over a period of about 2 or 2½ years of wringing out that remaining half of the equation in an operational environment, in the High Tech Motorized Division at Fort Lewis, we concluded that on several grounds the LAV-25 did not meet our requirements for a mobile protected gun system, both technically and operationally.

Consequently we made the decision this past fall to kill the second half of the equation, the LAV-25.

Senator **Cohen**. Then you will not have a lightweight armored vehicle in your inventory before 1989 or 1990?

General **Mahaffey**. Downstream, Senator.

Senator **Cohen**. Senator Wilson?

Senator **Wilson**. Thank you, Mr. Chairman.

NAVIGATING C-5 AND C-17

To pick up where we left off in the questioning, I am concerned about the aspect of the ability to navigate on the ground with respect to the C-5 and C-17. Am I correctly informed, General Ryan, that the C-5 was restricted to operating into Barbados during the Grenada operation?

General **Ryan**. We did operate the C-5 into Barbados, that is correct, sir—31 sorties. We would have had great difficulty in attempting to operate it into Point Salinas, for example, and likewise Pearls, the other airport actually on Grenada.

Senator **Wilson**. Would the C-17 have been similarly restricted?

General **Ryan**. The C-17 would have operated well into Point Salinas. It would have operated into Pearls with some difficulty but would have operated.

Senator **Wilson**. I think when I first came in I arrived in time to hear you comment that the intratheater study which is due to be completed this fall is something that you have been briefed on; is that correct?

General **Ryan**. Yes, sir.

Senator **Wilson**. This may be premature, but I am curious as to whether or not your briefing disclosed any facts or evidence which gave you reason to change your evaluation of the master plan, as well as your support for the C-17 as a critical element in that airlift master plan.

General **Ryan**. No, sir; it has not. The study in question, the WIMS study, is being conducted in three phases. Essentially phase 1 is complete. They are part way through phase 2 and are starting on phase 3. Phase 1 looked at the simpler, more easily quantifiable aspects of the intrathreater airlift—that is, the moving forward of supplies and equipment that are delivered to the major aerial and sea ports of debarkation as well as movement from the POMCUS sites.

Phase 2 will look at force repositioning within the theater and resupply of those forces, and then, finally, phase 3 will do the same thing under a hostile environment. And in order to simulate that, the study group has teamed up with a studies and analysis group in the Joint Chiefs of Staff for a war gaming scenario that will allow them to input their data in the computer and play that against that hostile environment.

But the characteristics of the C-17, as well as the rest of the airlift force, lend itself to the requirements that are emerging. While we do not have a number assigned to those requirements yet, I find nothing to change my mind.

Senator **Wilson**. I think it would be a safe statement that based on what you have gained from that briefing, however it may be quantified, you are inescapably going to have an intratheater requirement of some magnitude. Therefore it is really a question of whether you are able to skip the extra step of having to go into a major airfield and then relocate.

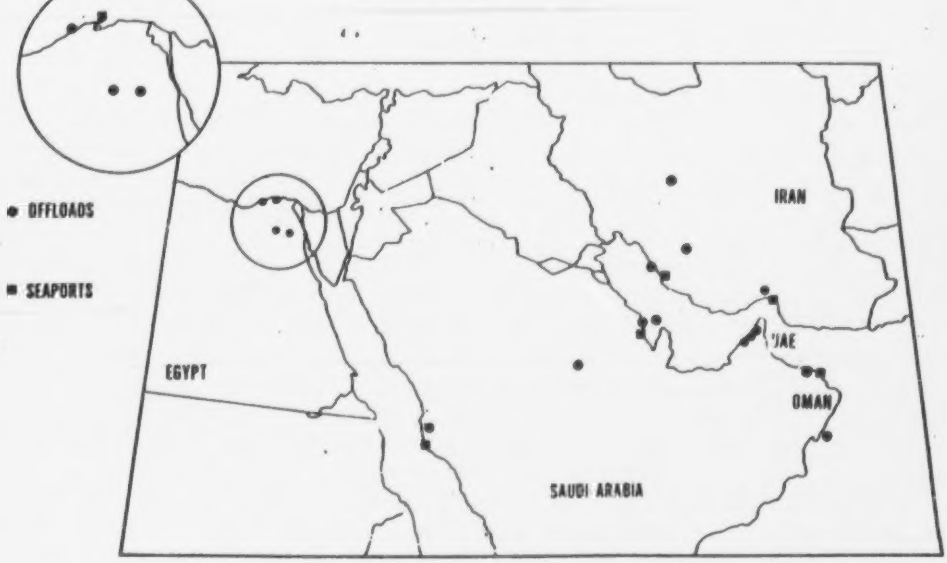
General **Ryan**. Yes, sir. I think it is very safe to say that there will be significant intratheater requirements identified and the capability of direct delivery that you have just described is of great advantage.

Senator **Wilson**. Mr. Chairman, because of the keen interest that the subcommittee has in this subject, I wonder if there will be at least workable modules of that study which, as they are completed, might be made available to the committee. It would assist us in the markup in the next couple of months.

General **Ryan**. I asked that very question of the Deputy Secretary of Defense in a letter not too long ago and the reply I received was that it is still too early to produce any concrete numbers.

We have talked a lot about the intratheater and direct delivery problem today and the value of additional air fields. I wonder if with the chairman's permission I can show a chart that would illustrate my point.

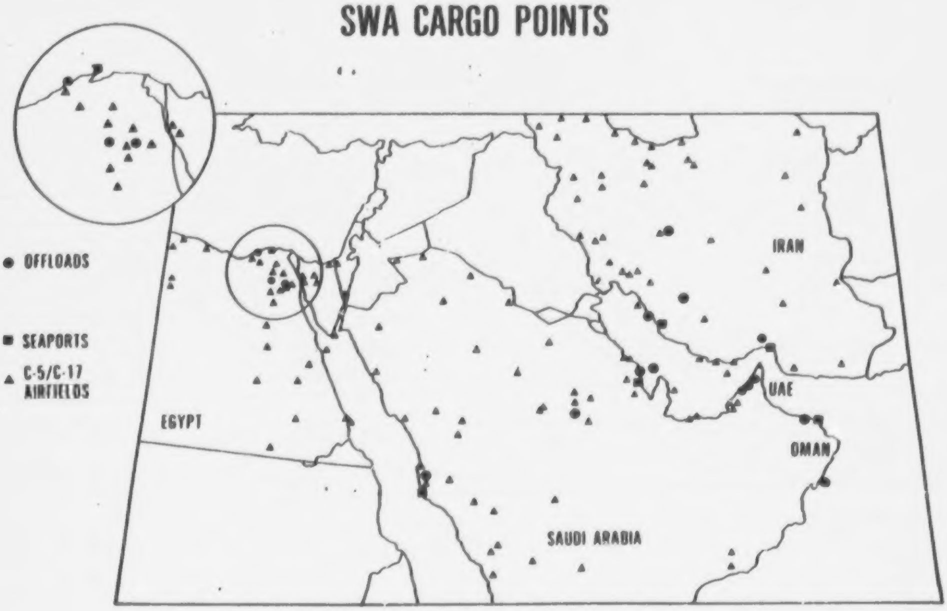
SWA CARGO POINTS



General RYAN. This is an outline of the Southwest Asia theater of operations showing--you can see Egypt, Saudi Arabia, the Arab Emirates and Iran. It also indicates 16 major aerial ports of debarkation.

Can I have the first overlay?

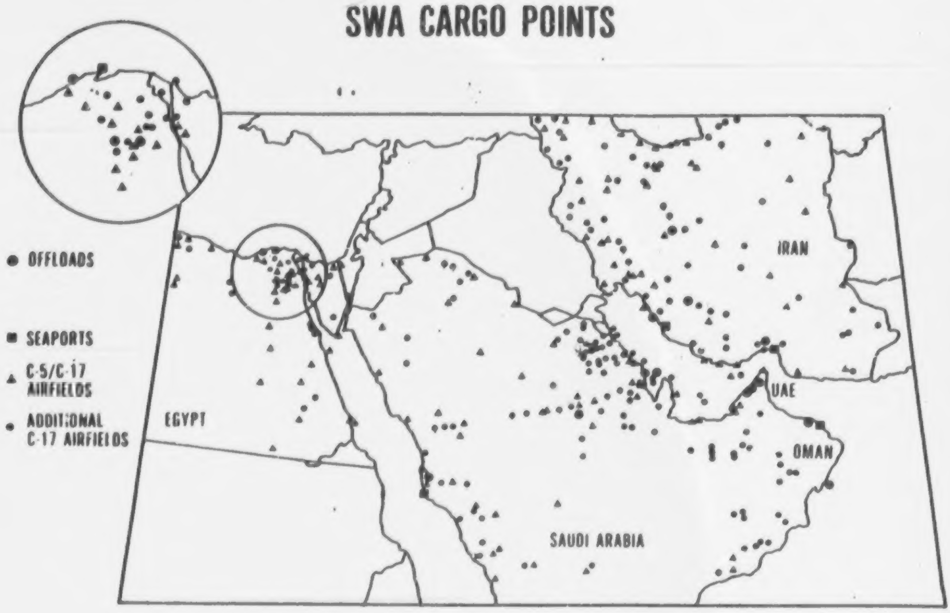
SWA CARGO POINTS


● OFFLOADS
■ SEAPORTS
▲ C-5/C-17 AIRFIELDS
EGYPT
IRAN
UAE
OMAN
SAUDI ARABIA

The concern that we expressed earlier was pileup of equipment and supplies at those major offload seaports and prepositioning sites. This overlay shows a total of 144 air fields throughout those four countries which can accommodate either the C–5 or the C–17. In the case of the C–5, a good many of those airfields will accommodate only one at a time. We call that a MOG of one—maximum on ground of one.

Can I have the final overlay?

SWA CARGO POINTS


● OFFLOADS
■ SEAPORTS
▲ C-5/C-17 AIRFIELDS
• ADDITIONAL C-17 AIRFIELDS
EGYPT
IRAN
UAE
OMAN
SAUDI ARABIA

If we look at additional airfields that might become available if we had a C–17 to introduce into this operation, we find there are an additional 173 airfields, for a grand total of 317 airfields that the C–17 could operate into, and that represents a 2.2-to-1 advantage over the C–5 and really addresses the point that General Mahaffey and I were discussing, and that is the ability to position those forces and that equipment close to where combat commanders need them.

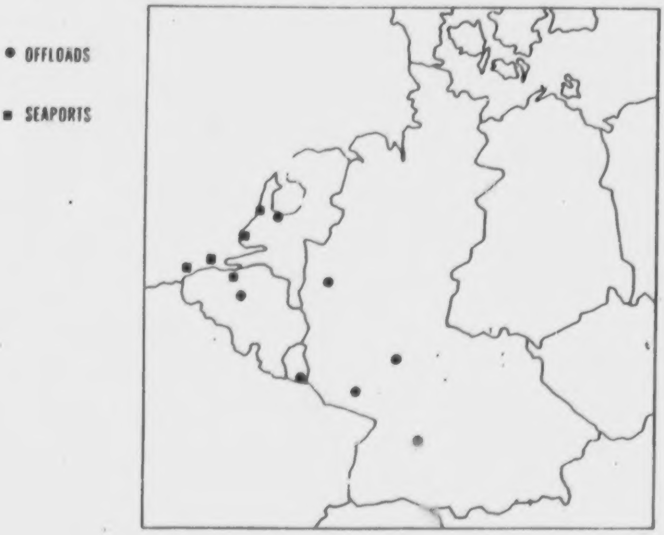
Senator Cohen. Now do you have similar charts for other regions where we have commitments?

General Ryan. I do, yes, sir. I can show you the same approach to the European theater, if you would like to see it.

Senator Cohen. I think it would be important. I am not trying to be facetious about it, but you may have, depending upon the Presidential candidates, some disagreement as to whether or not you want to make a commitment to defend Persian Gulf oil. Therefore, if that is the only rationale that one would have for going to a new aircraft, and spending billions of dollars, then some will say, well, we have become energy self-sufficient and do not need to try to defend those oil fields.

That is one argument that could be raised, so I think it is important that you present not only southwest Asia but also the other areas where it is reasonably likely that we may be required to go, and also that you show what resources would be available to do so.

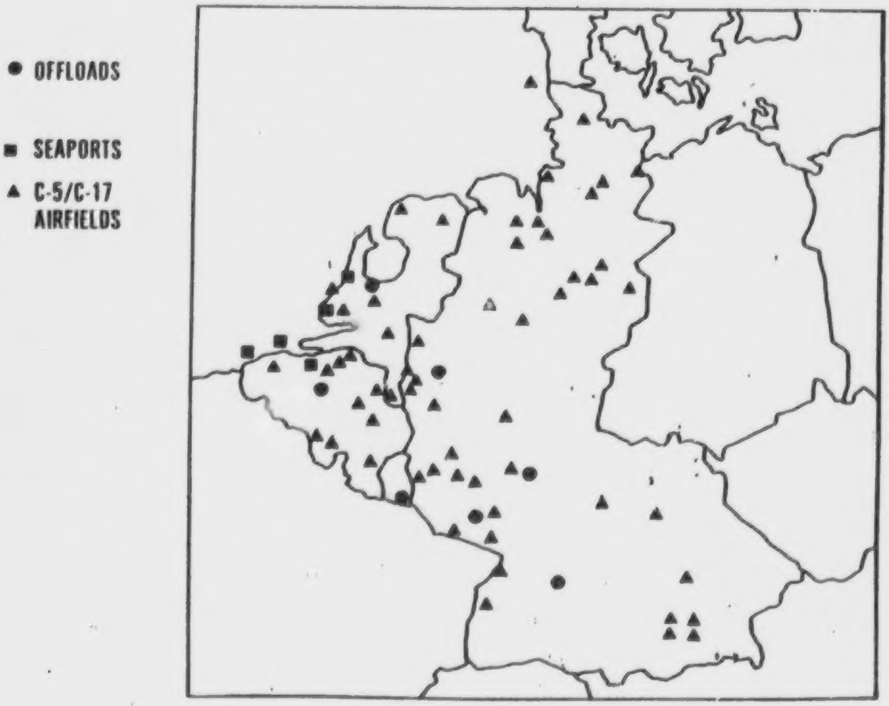
CENTRAL EUROPEAN CARGO POINTS



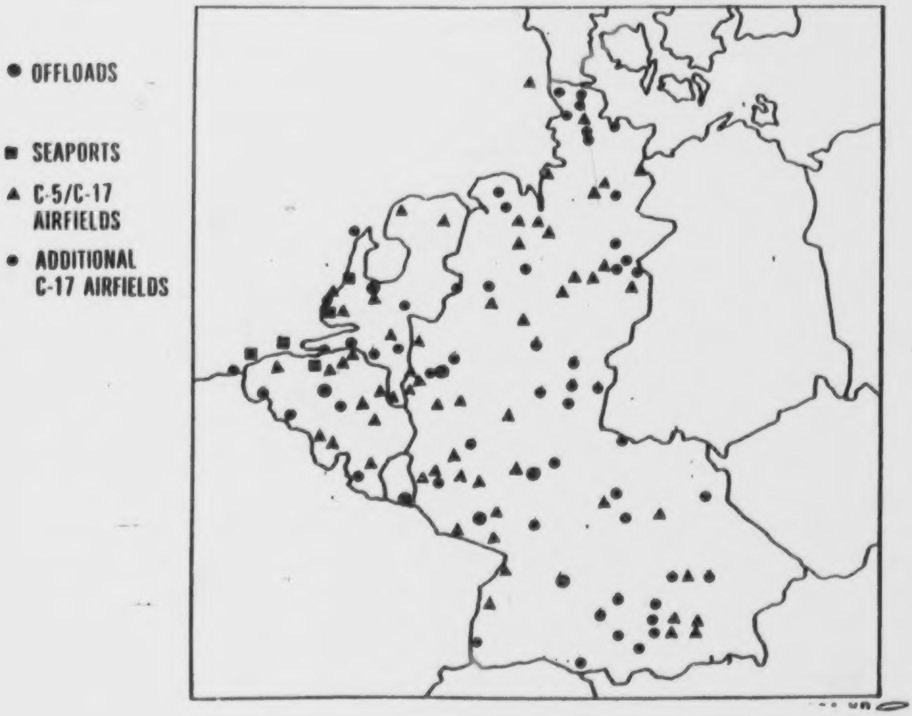
I think probably there is the widest agreement that we would defend Europe as our first priority, and the same principle applies here.

We see seven major aerial ports of debarkation—very large ones—five seaports, and six POMCUS sites. These are six pre-positioning divisions that the Army has arranged.

CENTRAL EUROPEAN CARGO POINTS



Following the same format, may I have the first overlay, we find a total of 73 airfields, to include the original 6—7, excuse me—that would accommodate either the C-5 or the C-17 or both. Again, 32 of those 73, for example, would accommodate only one C-5 at a time.



CENTRAL EUROPEAN CARGO POINTS

● OFFLOADS
■ SEAPORTS
▲ C-5/C-17 AIRFIELDS
● ADDITIONAL C-17 AIRFIELDS

This indicates some 60 additional, for a total of 133 airfields that would be available to the C-17. I think significantly in the eastern part of central Germany there is a dearth of airfields that can accommodate either a C-17 or a C-130, so again the same principle applies. The numbers are a little bit different, Mr. Chairman. I can also show a similar scenario for Korea.

Senator **COHEN**. Senator Wilson, do you have any more?

Senator **WILSON**. Yes, thank you, Mr. Chairman.

General Mahaffey, in your testimony you indicated that, and I am quoting from page four, "I do not anticipate a net reduction of strategic lift requirements as a result of the light division initiatives; rather, a substantial increase in our force packaging flexibility to respond to a wide range of contingencies. Improving our airlift capability through the C-17 is key to optimizing the strategic utility of the light infantry division."

LIGHT INFANTRY DIVISION

What you are trying to achieve with the light infantry division is a much greater flexibility in deployment.

General **MAHAFFEY**. Among other things, with respect to strategic deployment we believe it does give us much greater flexibility. There are a number of objectives.

Senator **WILSON**. In order to achieve that objective you have got to have an airlift aircraft that permits you, or at least allows you, to maximize the advantages you get from a light infantry division. You need to have a concommitant aircraft that allows you to move quickly to far-forward divisions.

General **MAHAFFEY**. Yes, but if I may expand on that a bit, the combination of the light infantry division in its current configuration and the C-17 is a case of serendipity. In its unaugmented configuation the light infantry division has no outsize equipment. That permits us, given the internal configuration of the C-17, to double row the equipment. That makes for maximum efficient use of the available cargo space within the C-17. It also, because of its direct delivery capability into those forward air fields, would minimize the need to do any transloading off of C-5's and C-141's onto C-130's. And, finally, if the division requires augmentation, which is part of the concept—that is, beef it up with direct or indirect fire support through the addition of corps level units including outsize equipment—the C-17's ability to carry that outsize equipment further foward would enhance the overall utility of the division. So on a number of counts we think it is, as I say, a case of serendipity.

Senator **WILSON**. Thank you, General. Can I assume that the Marines are in agreement with the Army on that?

General **GLASGOW**. Ours is a little different, sir. Senator, we of course have made strong moves toward enhancing the response time with maritime prepositioning programs as well as the Norway land prepositioning program. In the case of MPS we are loading the first maritime prepositioning ships in November of this year, the second one in August of next year.

With that concept we have an absolute need for strategic airlift. We require 250 aircraft sorties in order to move 16,500 people and additional supplies and equipment to the prepositioned equipment.

It becomes a critical point with us, that we have adequate airlift to support the three additive sets of equipment which transition into mechanized brigades. The equipment has been programmed and the 13 TAK-X ships are currently in existence.

Senator WILSON. Mr. Chairman, that is all I have at this time.

Senator COHEN. Gentlemen, thank you. It has been very helpful.

General RYAN. Thank you, Mr. Chairman.

Admiral WALTERS. Thank you, sir.

General MAHAFFERY. Thank you, sir.

General GLASGOW. Thank you, sir.

Admiral AVRIT. Thank you, sir.

Senator COHEN. The meeting is adjourned.

[Whereupon, at 12:05 p.m., the subcommittee adjourned, to reconvene upon the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

THURSDAY, MARCH 29, 1984

U.S. SENATE,
SUBCOMMITTEE ON SEA POWER AND FORCE PROJECTION,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NAVY RESEARCH AND DEVELOPMENT

The subcommittee met in open session, at 10:05 a.m., in room SR-232A, Russell Senate Office Building, Senator William S. Cohen (chairman) presiding.

Present: Senators Cohen and Nunn.

Staff present: Arnold L. Punaro, staff director for the minority; L. Wayne Arny III, David S. Lyles, Mark B. Robinson, professional staff members; and Kathleen L. McGuire, staff assistant.

Also present: James H. Dykstra, assistant to Senator Cohen; William S. Lind, assistant to Senator Hart; and James Steinberg, assistant to Senator Kennedy.

OPENING STATEMENT BY SENATOR WILLIAM S. COHEN, CHAIRMAN

Senator COHEN. The committee will come to order.

Today, we are receiving testimony on the Navy's research and development programs which fall under the auspices of the Sea Power and Force Projection Subcommittee.

It is my pleasure to welcome Mr. Jerry Cann, Principal Deputy Assistant Secretary of the Navy for Research, Engineering and Systems; Vice Adm. Al Baciocco, Director of the Navy's Office of Research, Development, Test and Evaluation, and Vice Adm. Ron Thunman, Deputy Chief of Naval Operations for Submarine Warfare.

Mr. Mel Paisley, Assistant Secretary of the Navy for Research, Engineering and Systems was scheduled to be here today, but with Secretary Lehman out fighting the air war on the Western frontier, Mr. Paisley was forced to stay on the other side of the Potomac to fight the budget war in the Pentagon.

Today, we also have some witnesses who are not from the Department of Defense. We are pleased to welcome Mr. Norman Polmar, a consultant with the Department of the Navy and the Department of Defense, and a well-known author; and Dr. Norman Friedman, the Deputy Director of National Security Studies at the Hudson Institute in New York, the author of several books on national defense, including "Carrier Airpower," "Naval Radar," and "Modern Warship Design and Development."

Today, we are going to devote the bulk of the hearing to a discussion of the new design attack submarine program. We will begin with a presentation by Mr. Cann and Admiral Baciocco on the Navy's overall R&D program, and then a brief summary of the new design SSN. This will be followed by separate statements by Mr. Polmar and Dr. Friedman, and then a followup statement by Admiral Thunman.

Hopefully, we can keep this session open as long as possible. I intend to close the hearing after Admiral Thunman's final statement, at which time we will be able to hear some classified portions of the admiral's presentation, or answer any other questions that may have arisen during the unclassified portion.

I am aware that each service is preparing a budget amendment that will have a considerable impact on many of the programs we are discussing today. I would like to continue with today's presentation, nonetheless, because I feel that this session will help us establish the Navy's R&D priorities regardless of any cuts; and I assume that most of the high priority programs, especially the new design SSN, will remain essentially unchanged.

Senator Hart is not here today; he is busy in New York. I have a number of questions from him. I will open this sealed envelope and find out what they are, and present them to you during the course of the discussion. I assume that Senator Nunn will try to be here sometime this morning, and he may have some questions.

Mr. Cann, why don't you begin.

STATEMENT OF GERRY CANN, PRINCIPAL DEPUTY ASSISTANT SECRETARY OF THE NAVY FOR NAVY RESEARCH, ENGINEERING AND SYSTEMS

Mr. CANN. Thank you, Mr. Chairman.

Mel Paisley asked me to again thank you for your understanding of his position today. He really wishes he could be here.

Senator COHEN. He submitted something longer and larger than "Gone With the Wind" for his statement. [Laughter.]

Mr. CANN. I was just going to point that out.

Senator COHEN. It is, and it will be made a part of the record.

Mr. CANN. As we go on here today, I would like to spend a few moments talking about Navy RDT&E priorities, and then Admiral Baciocco is going to characterize the budget briefly. Admiral Baciocco is appearing for the first time in his new job as the Director of Research, Development, Test and Evaluation for the CNO.

There is no question that the strategic deterrent Trident program is our No. 1 priority, and it is clearly fully funded. It is a national program, and it is moving along very well.

The second major priority is to support the 600-ship Navy, and to that end we are trying to put forth the correct design in our ships and submarines characterized by the DDG-51, the CG-47 and, of course, the new SSN that we are going to talk about at some length today.

Obviously, we are trying to build for the future, and that means we are doing R&D that will provide the necessary weapon systems and capability to give us the most cost effective capability on those ships over a long period of time, since many of these ships will be in the fleet up to 40 or more years.

We are clearly trying to improve our offensive capability and in that vein we are trying to distribute to more platforms our capability to launch weapons that are offensive, for example, Tomahawk by virtue of the vertical launch system both in the submarines and in the DD-963 class, as well as the DDG-51 and the CG-47.

We are also trying to improve our stand-off ranges through a number of facets, both in the carrier air world and in our use of Tomahawk, which is a long-range stand-off weapon.

Of great interest to all of us has been our desire to improve our self-defense and survivability. This has a very high priority. Our concern, which has been highlighted by recent events such as the conflict in South America a couple of years ago, is our ability to defend against low-flying cruise missiles and sea-skimmers.

We have a major effort to ensure we get the proper EW and self-defense systems in all of those ships. To that end, we have improvements in the R&D program to the CIWS system, that is the Phalanx Close-In Weapon System. We are working very diligently on off-board decoys. We are working very diligently on a joint program with FRG—the West Germans—to provide a Rolling Airframe Missile.

We want to be in a position to provide more survivability in the ships that we build. It is very true in the case of the DDG-51, which is the only new ship that we have designed in some time, and the survivability features of that ship are extensive.

Management initiatives consume a great deal of our attention in the Navy from the very top down. The Secretary of the Navy himself has led the war to improve competition. Obviously, we are trying to get all of our programs as close to fixed-price as we can. We are trying to move from about 26 percent of the programs being fixed-price up to about 86 percent.

In the case of contracting, once we put things into production, all changes must come through a process that we call the PMP process, which leads to the CNO and the Secretary personally approving modifications to production systems.

We are also, obviously, trying to increase our return on investment. In order to do this, we are trying to hold the line, to get more capability at less cost, and that is a very detailed kind of a problem. It has to be looked at piece by piece. I think we have discussed that in the statement that has been submitted.

Another of the things that we are doing is to reduce the number of R&D programs. Our goal is to end up with about 400 major and minor programs of all types by the end of fiscal year 1985. That is a major reduction in the last 3 years.

We are also, especially in the drill that we are engaged in right now, trying to take vertical reductions, that is, not just cut slices off of all programs and stretch them all out forever, but try to kill programs that are decided to be unaffordable based on the levels of funding that are available.

Obviously, if we can improve our reliability, maintainability, and availability, we will spend less time and less money on maintenance, training, and so forth. These have been major efforts to get better quality assurance. That was very clear in the HARM program.

We have instituted a process wherein we are designing better reliability in the very beginning of the program. We have a very large effort under the direction of the Chief of Naval Material, where Mr. Willoughby [the Deputy Chief of Naval Material for Reliability, Maintainability and Quality Assurance] runs a totally independent quality assurance evaluation program.

We are trying to do more testing, more operational testing. Probably the best example of that is the testing that we have conducted and intend to continue on the Aegis program. Then, of course, better management, we are trying to do a better job of keeping qualified program managers in the R&D program throughout their life.

You can't continue in this business unless you are exploiting technology. We have instituted a program in the last 2 years to focus on the highest payoff items and to bring them into the fleet more quickly.

Two examples of that are fiber-optic technology, and what is called Very High Speed Integrated Circuit technology. At the same time, we are trying to keep a broad enough base so that we don't mortgage the future.

Finally, the subject of independent testing comes up. We simply want to point out that the Department of the Navy has always supported all the initiatives the Congress has put forth to have independent testing.

As a matter of fact, the general view in the Navy is that we sort of invented it. We feel our operational testing is the model for how independent testing should be run.

With this very brief overview of the high priorities in the R&D budget, I would like to submit the prepared statement of Secretary Paisley and have Admiral Baciocco characterize the budget very briefly for you, and then we will be prepared to get into the SSN discussion.

[The prepared statement of Mr. Paisley follows:]

PREPARED STATEMENT OF MELVIN R. PAISLEY, ASSISTANT SECRETARY OF THE NAVY (RESEARCH, ENGINEERING AND SYSTEMS)

INTRODUCTION

Mr. Chairman and members of the committee, I am pleased to appear before this subcommittee again to present to you the FY 1985 program and budget for Research, Development, Test and Evaluation, Navy. With me today, here at the table, are Vice Admiral Albert J. Baciocco, Jr., United States Navy, Director, Research, Development, Test & Evaluation for the Chief of Naval Operations, Brigadier General Eugene B. Russell, Deputy Chief of Staff for Research, Development and Studies, U. S. Marine Corps, and Mr. Gerald A. Cann, my principal deputy on my own staff.

The President has emphasized the importance of maritime power to this Nation. That this view is shared by the country at large has been made evident by the strong support of this Congress for the Naval Recovery Program chartered three years ago. The FY 1985 budget is a request for the continued implementation of that program. It represents, collectively, our best ideas on building a strong Navy and Marine Corps to protect our "island nation."

For me personally, these past three years have been a unique challenge as I have attempted to match the urgent needs of the Fleet with the potential of our industry toward goals you, the Congress, have established. Today, I continue in that effort.

I feel that it is my responsibility in our partnership to be forthright, and I reiterate my pledge to that effect again this year. My staff and I are ready to assist you and to provide prompt response to any questions.

I would like to give you an overview of our budget and program, describe some of the management initiatives we feel have provided for more efficient allocation of resources, and describe the capabilities we are developing for our various mission areas. I will also call your attention to the investments that we propose for the Technology Base.

BUDGET OVERVIEW

I believe that the program is well aimed at attaining capabilities consistent with national interests and fully supportive of the Department of the Navy's contribution to the national defense effort. Our $9.8 billion budget represents less than 10% of the Department of the Navy's Total Obligational Authority and a percentage less than that historically deemed adequate in the 1960's and 1970's.

Resource allocation may be divided into three major subdivisions: Development, Technology Base and Management Support.

By far the largest of these at 86% of the RDT&E budget is Development in which we conduct advanced and engineering development of our systems. 8% of our budget supports the technology base wherein future capabilities are derived from exploratory research. The 6% for management support funds people, ships, aircraft and the other costs in support of our R&D facilities, centers and labs. The planned increase for TRIDENT/D-5 development and the fact that some of our larger tactical programs are entering full-scale development account for most of increase in the Development area.

National security is not measured by the percentage of the total government budget allocated for that purpose, but by the capabilities that allocation affords. It has been this country's policy not to plan to engage the threat we face in our adversary by matching capabilities--ship for ship, missile for missile, sailor for sailor. It is fundamental to our philosophy that we offset the superior numerical advantage of our enemy by superior qualitative performance and a technological edge.

There are five areas in which the Navy possesses that margin of difference: the performance of our SSN's, Anti-Submarine Warfare (ASW), Navy/Marine Corps Amphibious Team, tactical air at sea, and strategic deterrent of the TRIDENT II/D-5. It is toward the need for continued qualitative advantage in these areas that the R&D budget is largely responsive. The Chief of Naval Operations has referred to these areas as the "five jewels in our crown." But let us not rest on our laurels; we must continue to improve to match the rapidly evolving Soviet threat.

MAJOR THRUSTS

It is the goal of the R&D acquisition process to improve maritime effectiveness. Toward that goal, we have achieved initial operating capability in a number of new systems, the most significant of which are the submarine launched TOMAHAWK anti-ship missile, and HARM in the A-7 aircraft. Another major milestone toward fleet effectiveness is to bring our programs into full-scale development. We are proud to report that a number of important initiatives have reached that point. These include the Submarine Advanced Combat System (SUBACS), the Advanced Lightweight Torpedo (MK-50), the Joint Tactical Information Distribution System (JTIDS), the TRIDENT II/D-5 missile and the very important Enhanced Modular Signal Processor.

Our modernization efforts continue to be responsive to fleet requirements, lessons learned from the experiences of our allies in the Falkland Islands, the experiences of our own forces in Grenada and Lebanon, and to the experiences gained from fleet exercises. Both our near-term modernization efforts and our long term investment strategy are based to a large extent on the studies we conduct. The Outer Air Battle and Anti-Submarine Warfare Improvement Studies are the more pronounced examples which have been recently concluded. I will comment further on the implementation of the study results throughout the mission areas they support, and point to the influence they have on our future technology initiatives.

From these experiences and studies, and consistent with our naval strategy we have better defined our needs for a number of critical programs in the tactical warfare area. Among these programs are the DDG-51 Guided Missile Destroyer, the New Design SSN, the F-14 and A-6 Improvement Programs, and the JVX aircraft that is so important for the Marine Corps mission.

We are also making major thrusts of a technical or engineering nature. For example, we are aiming for a time late in this decade when we will have great commonality of avionics in our tactical aircraft. The highly successful avionics systems in the F/A-18 will be used as much as possible in our upgrades of the F-14, A-6 and AV-8B aircraft. We expect this commonality to bring about major cost savings in the future. Another major thrust is in the area of sensors for use in anti-submarine warfare (ASW). We have a broad range of program changes to address the increasing Soviet threat. In Anti-Air Warfare (AAW) we are convinced that we must provide our battle forces with weapons capable of intercepting enemy aircraft before they can launch their missiles. Because of increasing standoff ranges for launch of enemy missiles, the implications for our Navy systems are significant. As a final example I would note that we have a technical and engineering thrust underway to apply the benefits of fiber optic technology to Navy systems. We have programs underway now to apply fiber optics in data busses, sensors, and communications, and I expect this effort to grow larger in the future. In these areas, and others as well, we are continuing to apply lessons learned from studying the experiences of the forces involved in the Falklands, Grenada and Lebanon. We intend to ensure that our Navy remains capable of fighting and winning in the future.

MANAGEMENT

I want to recount my Engineering Economics Professor's axiom--that an engineer is trained to build for one dollar what any damn fool can build for five dollars and change. This means that in the present pursuit of the "best," ingenuity and know-how must be utilized to control costs, and the "good" should perhaps be provided as an evolutionary step towards realization of an "affordable best." That philosophy is at the heart of our program.

A very important mechanism which we began last year and have successfully used to control cost in the procurement of aircraft, missiles and shipboard components is the Program Managers Proposals (PMP's). The PMP's, which contain every engineering change proposal (ECP), are reviewed by the Secretary and the CNO. This control mechanism keeps the nice-to-have items out while permitting the essential changes relative to cost reduction, reliability and safety.

Additionally, there are more efficient ways of managing those resources which are available. We have imposed more discipline upon the selection and scheduling of new projects, thereby cutting in half the number of new starts per year. We have brought stability into our program by reducing the total number of R&D projects by 17% from 507 in the FY 1984 budget to 421 in the budget proposal before you.

The sharing of appropriate technology efforts with our allies provides the opportunity for a mutual investment strategy for mutual savings. To that effect, we are improving and expanding our technical relationships with our allies. Presently we have eight co-development programs and through the foreign weapons evaluation program, we are testing twelve fully operational systems. Should those systems satisfy our require-ments, both time and expenditures would be saved in acquiring the new capabilities. To continue gaining from shared experiences we have 268 programs for the exchange of technical data.

On the other hand, our investments are a precious resource, and we simply cannot afford to have them leak away to unfriendly governments. We are, therefore, exercising tighter control over the transfer of technology to hostile foreign governments.

We also have an eye out for joint programs with our sister services, and have participated in a tri-service review of ways for more efficiently transitioning projects from development to production. We have strengthened our procedures and plans for selecting, training, and providing career opportunities for both civilians and officers in the field of acquisition management.

Finally, increasing competition is the core of our management improvement program. A flag officer has been appointed to be our first Competition Advocate General. His objective is to increase competition in all types of procurement. For example, he has successfully contested and resolved many contractor assertions of proprietary rights in spare parts procurement.

In the R&D area in particular, we not only ensure that we reap the benefits of competition in new programs, but have also initiated procedures by which at periodic decision milestones, each program is given an independent assessment as to the benefits of introducing competition at that point. The emphasis is on design and technical competition throughout the R&D program and on price competition during the production of the system. In FY 1983, over $3 billion dollars in contracts were awarded under the R&D negotiation exception; of these slightly less than $1 billion were awarded competitively (30.1%, nearly the same as the Navy average for all contracts).

We have several programs where competition is a keystone, including MK-48 Advanced Capability (ADCAP), MK-50 ALWT, CV Inner-Zone ASW Helo, common ejection seat, and AN/UYQ-21. In other programs, such as SUBACS, competition at the subcontractor level is required. Finally, in new start programs such as the new SSN design, competition is not only encouraged in the design phase, but a key requirement to ensure that producibility considerations remain at the forefront so that competition may be introduced expeditiously as the program matures.

The balance of this statement will address programs of interest in Development and the Technology Base. I will categorize the development programs in the traditional Naval Warfare areas. The FY 1985 program contains major modernization initiatives in several areas along with important efforts in support of the President's goal of a modern and capable 600-ship Navy by the end of this decade. I will start with Strategic Warfare.

STRATEGIC PROGRAMS

President Reagan's strategic modernization program, outlined in five parts on October 2, 1981, was aimed at strengthening all legs of the U.S. Strategic Triad and providing an enduring command, control and communications structure for our deterrent forces. The Navy's strategic programs are of particular importance because their successful execution can contribute so much to achievement of a stable strategic deterrent posture. Offensive strategic programs, consistent with the President's modernization goal, remain of the highest priority within the Navy. The increased ocean area from which our long-range missiles may be launched, along with present development initiatives to fully utilize that area, will provide for a continued highly survivable strategic deterrent for the 1990s and beyond.

As reported last year, TRIDENT II (D-5) alone accounts for 22% of the total Navy R&D budget in FY 1985. The TRIDENT II

(D-5) weapon system, which entered Full-Scale Engineering Development in October 1983, takes advantage of recent technology advances to provide us with the required accuracy and range for the prescribed targets. In addition, the warhead design definition and cost study has been completed and the warhead Development is entering into Phase 3, or development engineering. The ultimate size of the TRIDENT submarine force is yet to be determined. There are a total of 16 TRIDENTs planned through the five-year defense plan, and the Navy has tentative plans for a force size of about 20 TRIDENTs. This number is tentative as the ultimate number of TRIDENTs to build will be influenced by the capabilities of the other legs of the TRIAD, and by whatever arms control agreements may be effective in the future.

Improvements to our strategic communications have been sought through construction of the upgraded Extremely Low Frequency (ELF) transmitter in Wisconsin and installation of a second ELF transmitter at K.I. Sawyer Air Force Base in Michigan. While our current ELF program is delayed by litigation, we anticipate a revised environmental impacts study which will clear the way for continuation of this effort.

The strategic connectivity improvements for TACAMO, and the addition of ELF, are necessary because of the large operating area of our strategic forces, and in making our deterrent posture credible.

Future credibility for our strategic deterrent will depend on the investments we make today, as our credibility today is a result of investments made with foresight in the past. Largely because of these earlier investments, we have been able to make advances in defense technology which have strategic implications. Drawing from these implications, President Reagan has issued a Strategic Defense Initiative, the objectives of which are fully supported by the Navy and myself personally. Defensive technology in the United States, as is pointed out in this initiative, has progressed to the point where effective systems are possible.

Assuming some progress in Soviet defensive technology, aids to our penetration of enemy defenses must be considered. The offensive needs and defensive capabilities are not exclusively Navy issues however. Therefore, the OSD, Navy, Air Force and Army are working to determine the penetration aids requirements for our offensive systems to allow them to penetrate enemy defenses.

AIR WARFARE PROGRAM

In 1983 the Department of the Navy established the foundation for modernizing several fleet aircraft systems (aircraft and weapons) to counter the growth in enemy quantity and quality. While initiating the development of upgrades to our first line fighter and all-weather strike aircraft, the F-14A and A-6E, respectively, we have continued our highly successful initiative to control aircraft and weapons unit costs. We are minimizing costly changes through our in-depth review and justification process for engineering change proposals (ECP's). In addition, we are expanding the use of firm fixed price contracting to aircraft and weapon systems previously not under this effective cost type control.

The Outer Air Battle and the All-Weather Medium Attack Aircraft Blue Ribbon Oversight Studies were completed in 1983.

The Outer Air Battle Study, inparticular, emphasizes the importance of an upgrade to the F-14 aircraft. The improved F-14 aircraft program includes: (1) more powerful, more reliable engines; (2) an improved avionics package which will stress reliability, maintainability and commonality with other tactical aircraft and will provide for the integration of JTIDS, ALR-67 and AMRAAM; and (3) an improved radar.

The All-Weather Strike Aircraft Study and the outstanding results of the recently exercised all A-6E Attack Air Wing, clearly indicate that a properly upgraded A-6E is the most cost-effective option to satisfy the Navy's medium attack mission through the mid to late 90's. We are continuing to refine the specific upgrade to ensure maximum commonality of developments with the F/A-18, F-14D and AV-8B, and to minimize cost of ownership. We intend to begin full-scale development of an upgraded A-6 as soon as possible. The A-6E upgrade will for the lowest R&D cost, incorporate an improved radar and feature survivability, reliability and maintainability improvements, of which will lower our operating and support costs when these aircraft begin to reach the fleet.

With regard to development of a system for training undergraduate jet naval aviators, VTXTS, we have been directed by the Congress to restructure the program to an all carrier capable aircraft. We will have a fully defined VTXTS program to present to you by the end of March.

In FY 1984 we accelerated development of technology for a low-cost seeker for anti-radiation weapons. The program we have structured will in a few years, give the DoD the flexibility to transition this technology to other programs.

The development of high performance targets for our test programs continues at an accelerated pace to provide the most complete weapon systems testing possible. For example, the Supersonic Low Altitude Target (YAQM-127A) development contract will be competitively awarded this July. This is one year earlier than I reported to you last year as a result of our actions which have included reprogramming additional funds into FY 1984. Finally we have embarked on a program to develop a Navy Common Ejection Seat (NACES) for use in the F/A-18, TF-18, T-45A, F-14D, and improved A-6E aircraft. We plan on an open competition to select a single seat design. The contractor (leader) selected will then develop a second source (follower) to co-produce the winning seat design. In addition, we plan to break out and compete a number of the consumable items on the seat to further reduce the cost of ownership.

SURFACE WARFARE PROGRAMS

In the past year we have made progress in R&D programs which increases surface firepower and improves fleet effective-ness. We have emphasized improvements in offensive standoff capability, and in defending our battle groups against anti-ship missiles (ASM). Our powerful new combatant, DDG-51, is moving forward on schedule. We are continuing our program to backfit vertical launchers on the SPRUANCE class destroyers, install them in the CG-47 class cruisers, and provide a second source for launcher production. The 5-inch guided projectile is in the preproduction phase, and a competitive award was made for SEAFIRE, the companion electro-optical Gun Fire Control System. We have focused on extending our organic battle group weaponry into the outer air battle while continuing to upgrade our area and point defense capabilities against fast, high and very low altitude and low radar cross-section ASM's. The Outer Air Battle Study, examined all these areas in detail. The R&D budget for AAW reflects in large measure what we learned. We have also continued development of more reliable, survivable and efficient shipboard components and machinery to enhance readiness, maintainability, and availability.

I would like to describe further some of those programs which I believe are critical to ensure that we can continue to stay ahead of the anticipated threat of the 1990's.

ARLEIGH BURKE (DDG 51) is a tough, new and battle-worthy destroyer which will replace the workhorse DDG 2 and DDG 37 classes of guided missile destroyers. ARLEIGH BURKE will provide more multi-mission firepower to the Battle Force than the ships it replaces. It will also provide protection for Underway Replenish-ment Groups, Seaborne Commerce and Amphibious Assault Forces with their follow-on echelons. DDG 51 will be the most capable and survivable destroyer ever built in this country. Combat system capability meets Fleet performance/firepower requirements against the threat, and DDG 51 is affordable. The design has been strictly controlled to preclude unwarranted growth in cost and complexity. Initiatives have been executed to increase competi-tion for subsystems or provide incentives to lower the cost of components. Producibility has been improved because the design takes advantage of past successes. For example, the propulsion plant is a continuation of the proven DD 963 and CG 47 plants. The DDG 51 crew is 80% of the manning required by older de-stroyers. Contract Design began in May 1983 and is on schedule. Contract award for the lead ship is scheduled for December 1984. Construction will commence in April 1986.

The Rankine Cycle Energy Recovery System (RACER) is continuing in development, targeted for installation in the second flight of DDG 51, after completion of a thorough testing program which will commence later this year. RACER has experienced some funding shortfalls and difficulties in scheduling at-sea testing. However, these problems are well in hand. We are firmly committed to completing this development program as planned.

Initial application of the Ship Systems Engineering Standards (SSES) is occurring in DDG-51. ARLEIGH BURKE will include standard A and B weapons modules housing the forward and after Vertical Launchers, respectively. The next objective of the SSES Program is to develop all the standards necessary for incorporation in the design of the next class of Frigate, currently planned for the early 1990 timeframe. The Navy will also investigate expansion of SSES into subsequent DDG-51 flights.

USS TICONDEROGA, our first AEGIS ship remains impressive. The ship has performed superbly while on deployment to the Sixth Fleet where she has been highly praised for the improvement her systems provide to the performance of other ships with which she is NTDS-linked. All operational requirements have been met or exceeded. TICONDEROGA has established an entirely new level of seaborne anti-air warfare capability. Although her capability is unmatched by any other ship in the world, there are apparently still questions in some circles about the cost-effectiveness of the system based on frequently misunderstood operational evaluation testing results. The fact is that the AEGIS System has been tested more than any in history and under far more demanding circumstances than any previous system. The results have been impressive, but there were deficiencies. Some have been corrected, and we are moving out on the others. For example, 27% of the failures in OPEVAL were due to human errors which will disappear as we move up the learning curve and which, in fact, have already been incorporated as "lessons learned" in the AEGIS training program. An additional 33% were due to missile failures which are the subject of a vigorous missile improvement program. The system logic deficiencies experienced have been corrected by software modifications. As you can see, the testing to date has provided substantial dividends and the Navy is planning to conduct additional testing this year.

Planning is now underway to conduct an additional series of operational tests in the late spring which will stress the AEGIS system against a wide variety of targets. This testing will be conducted under the auspices of the Navy's independent test and evaluation organization, Commander Operational Test and Evaluation Force (COMOPTEVFOR), and will present the AEGIS platform with several realistic scenarios involving multiple and simultaneous engagements.

Last year, I reported that the New Threat Upgrade (NTU) program was undergoing OPEVAL aboard USS MAHAN. This system gives our TERRIER and TARTAR cruisers and destroyers the capability to detect and engage BACKFIRE-launched, high-altitude, high-speed cruise missiles in a jamming environment. MAHAN demonstrated superlative performance during OPEVAL and has maintained this exceptional performance during her recent Mediterranean deployment. Approval for full production has been granted for the TERRIER NTU combat system and subsystems. NTU installations will begin in 1986 and will be completed in 1992.

Completion of this program will result in a significant AAW improvement to 32 major battle group surface combatants.

Our original programs to improve the AAW capability of FFG 7 class ships are on track. In Phase I, we have completed the design and testing of near-term performance and reliability improvements to the MK-92 Fire Control System. Installation of these alterations began in October 1982. The second phase, development of a coherent receiver/transmitter (CORT) and improved signal processing capability for the MK-92, is expected to provide detection range improvements of 50% in clutter and 70% in a jamming environment. A development contract for Phase II was signed with Sperry in June 1982. Due to development difficulties, at-sea testing recently slipped to 1985. Installations are currently planned to commence in FY 1988. Phase III adds a phased array radar to the MK-92 Fire Control System. In August, the Navy signed a contract with Sperry to commence preliminary engineering design of the radar. In the meantime, we have been negotiating the details of a definitized fixed-price contract for full-scale engineering development. We estimate the total R&D cost for this program to be in the range of $170-180 million. There are concerns within the Navy and in industry about the affordability and executability of the Phase III Program. We are working hard on cost and schedule alternatives with a view toward resolving our difficulties this year.

The Navy continues to address deficiencies in its anti-ship missile defense systems. Extensive effort is being devoted to developing low-altitude fuzes which will allow shipboard missile systems to more successfully engage the lowest of the low-flying "sea skimmer" missile threats. Additionally, flight testing of the Rolling Airframe Missile (RAM) prototype round is continuing. This system, which is being developed in cooperation with Germany and Denmark, will provide naval forces with a high firepower, low-cost self-defense missile system capable of dealing with the evolving threat. Improvements are also being made to the PHALANX Close-In Weapon System to enhance its reliability and effectiveness. As part of this process we will continue operational tests of PHALANX to validate its effectiveness in a realistic operational environment.

We have initiated a program to develop a shipboard infrared search and target designation system. This system, which we have designated SAR-8, will enable us to detect the infrared signatures of aircraft and missiles and rapidly designate these threats to shipboard weapon systems for engagement. This system will improve our AAW capability in a jamming environment by alerting and cueing our radar systems, and will provide a passive surveillance capability while operating in a radar silent EMCON condition. The second program is the development of an Advanced Tactical Radar System. We intend to initiate this effort in FY 1985. This program will focus on two radar developments: one for surveillance, the other for weapon support. Initial efforts will be on the surveillance subsystem which would have potential application as an adjunct radar in the AEGIS combat system. The entire system is being developed as an affordable surveillance and weapon engagement system for the next generation of small to mid-size combatants.

The restructured TOMAHAWK program which will be submarine and land launched as well as surface launched, is now fully in effect. The Navy is firmly committed to dual source procurement of TOMAHAWK, and the FY 1985 budget supports such procurement request. The anti-ship and land attack (nuclear) missiles have completed successful operational evaluation on a submarine, and evaluations are in progress on a surface ship. As a result of the successful testing, the anti-ship version has been introduced into several submarines in the Atlantic. The Ground-Launched Cruise Missile (GLCM) system is on schedule, and has been deployed to the United Kingdom. Land Attack (conventional) missile development is on track with developmental testing to commence later this year.

In addition to reactivating the impressive gunnery capability in our battleships, we are continuing to enhance existing naval gunnery capability and improve reliability, maintainability, and availability of all our gun fire control systems. Insensitive munitions are being developed to improve safety and producibility, and reduce vulnerability to propellant driven fires and explosions caused by shock or fragments.

Earlier, I mentioned a very important naval gunnery improvement is the Semi-Active Laser Guided Projectile. These projectiles will be fired from five-inch guns and will enhance our capability to provide very accurate naval gunfire during amphibious assault operations, and against enemy ships. The Guided Projectile is in the preproduction phase and should be ready for competitive full-scale production by FY 1986. The associated laser fire control system, SEAFIRE, was competed last year and is now under contract for full-scale engineering development. We anticipate first delivery of production systems to DDG 51 class ships in 1989.

ANTI-SUBMARINE WARFARE/SUBMARINE WARFARE

The Soviet submarine combat capability is dramatically improving not only with the introduction of improved submarines but also with more effective, longer-range weapons. This has presented a real near-term challenge to our ASW modernization efforts. In June 1983, an ASW Investment Strategy Assessment was completed which enunciates the plan we will follow in ASW development over the next 10 years. Following this strategy, we are structuring comprehensive development plans designed to maintain a healthy tactical advantage over the Soviet submarine fleet. To support this, the Navy program for ASW sensor development has been assigned one of our highest priorities. Let me elaborate.

The Soviet submarine threat is real and exists now in the form of VICTOR III and OSCAR class ships. In response to this, we have taken immediate action to provide our submarine forces with a near-term capability. We are developing an improved Towed

Array which will be integrated into the attack submarine sonar system and will enhance its detection and localization performance. We have accel-erated this development and are procuring stand-alone systems.

Looking into the 1990's, our attack submarines must possess adequate tactical advantage to counter the numerically superior Soviet attack submarine force. Our 688 Class attack submarine, designed more than 15 years ago, has been significant-ly improved since its original introduction. The margin which was designed into the 688 Class submarine will be depleted by the time we finish our 688 improvement program in the early 1990's, however, and there will be no further volume available in these submarines to allow further quieting. Our nuclear attack submarine research and development program has, therefore, been focused to provide the technology for the design of a new attack submarine aimed toward authorization of a lead ship in FY 1989. The design of this new submarine is among the Navy's most important research and development programs. Affordability is key to our plan, and full advantage will be taken of the cost-reduction techniques realized in development of TRIDENT and 688 Class submarines. This new submarine will be affordable, enabling us to achieve force level requirements by allocating approximately the same share of the SCN budget that attack submarines have received in the past.

With the introduction of improved sensors, signal processing requirements are growing. A very large increase in acoustic processing power will be realized with the Enhanced Modular Signal Processor (EMSP) and Very High-Speed Integrated Circuits (VHSIC) technology. This processor is generic in design and therefore has application to a great many requirements including some not related to acoustic processing. We have undertaken an initiative to establish an overall strategy for ASW signal processing for the next 10 years and are developing the methods to control the rapidly escalating costs for software required to support our programmable signal processors.

The Submarine Advanced Combat System (SUBACS) ties together sensor, signal processing, and combat system improvements. SUBACS uses a top-down functional design. SUBACS will permit combat enhancements to the 688 Class, and also forms the basis for the sensor and combat systems for our SSN. The initial phase, SUBACS BASIC, has entered Full-Scale Development and will be introduced in the FY 1983 attack submarines. The second phase, SUBACS A, will be the first user of EMSP.

In Surface ASW, the DD-963 class, the Navy's primary ASW surface combatant, will receive a total upgrade of its present ASW suite over the next several years. The LAMPS MK-III will replace the LAMPS MK-I helicopter, the AN/SQR-19 tactical towed array will be added, the digital AN/SQS-53C will replace the analog version, and the vertical launch ASROC systems will replace the ASROC anti-submarine rocket. The entire ASW suite will be linked together by the ASW Combat System MK-116 MOD-6 which integrates the sensor and weapon systems. A presently initiated near-term upgrade to the AN/SQR-19 will significantly extend the system's detection and localization performance.

To counter the submarine threat of the late 1990's and address the requirements for future surface ASW ships, an advanced sensor development program has been initiated. Key elements of this effort provide long-range passive and active submarine detection, classification, and localization.

The magnitude of the threat represented by the Soviet submarine-launched torpedo has necessitated more emphasis being placed on the defense of our battle groups, logistics and amphibious task forces. In December 1983, we directed the Surface Ship Torpedo Defense program to accelerate the development of torpedo countermeasures.

Air ASW is also of vital concern to us, and our ASW Assessment indicated the need for new tactics, new processing procedures, and new sensors to provide a force multiplier effect to our airborne ASW platforms. With some modest increase in RDT&E funds, we will improve overall force effectiveness without the significant increase in sonobuoy expenditure, rates which would otherwise be required to detect and localize the quieter threats with present sensors. As a part of that strategy, we have initiated a program which capitalizes on modern manufacturing techniques to produce a new class of low-cost sonobuoys.

The Navy is pursuing a balanced ASW investment strategy regarding airborne ASW platforms. It is aimed at maximizing the probability of combating enemy submarines operating in open ocean areas and in opposition to the CV battle group in the outer and inner zones. The continued introduction of LAMPS MK-III helicopters and the modernization of the P-3C and the S-3 weapon system improvement programs are directed toward the open ocean and outer-zone ASW problems. The inner-zone ASW responsibility is currently being handled by an aging fleet of SH-3H helicopters. Our competitive development and acquisition of a new CV inner-zone helicopter will lead to a cost-effective replacement for a declining SH-3H inventory.

In the surveillance area, the introduction of mobile Surveillance Towed-Array Systems (SURTASS) in late 1984 will provide complementary area coverage and partially offset the reduced capability of our fixed systems. However, in the long-term, we need to aggressively utilize the Fixed Distributed System (FDS) concept Implementation of this distributed sensor requires the Navy to capitalize on recent fiber optic technology developments. The recent successful fiber-optic cable testing by Bell Laboratories and their plan to install a transatlantic fiber-optic cable by 1988 are indications of the low risk of this technology. Before I leave the surveillance area, I should mention the Rapidly Deployable Surveillance System (RDSS). During the past year, the management of the RDSS program was restructured, and a new mechanical design was selected. This program is now on track.

Our advanced ASW weapon developments are on course. These include the Advanced Lightweight Torpedo (MK-50), MK-48 Advanced Capability (ADCAP) Torpedo, and the Submarine ASW Standoff Weapon. The MK-50 lightweight torpedo completed Advanced Development in 1983 after a test series which culminated in the successful demonstration of its guidance system. The Secretary of Defense completed his acquisition review of the MK-50 program in January 1984 and will authorize Full-Scale Engineering Development for the baseline torpedo in the near future. The MK-48 ADCAP Torpedo will ensure that we maintain our submarine combat superiority against threat submarines and surface ships in all environments. Although we have experienced some problems in software development, we are solving these problems and expect to reach operational evaluation on schedule. The submarine ASW Standoff Weapon, which will replace the aging Submarine Rocket (SUBROC), is proceeding in Advanced Development.

All of the following systems will enter the fleet by the end of this decade: the Submarine Advanced Combat System (SUBACS Basic), the LAMPS MK-III ASW helicopter, the CV Inner Zone Helicopter, the S-3 weapon system improvement, the AN/SQS-53B and 53C surface ship sonars, SURTASS, near-term improvements for the surface tactical towed array system, the submarine low frequency thin line towed array acceleration initiative, SOSUS upgrades including the Fixed Distributed System, and the combined countermeasures towed project of the Surface Ship Torpedo Defense

System. Other projects such as the New Design Submarine will ensure undersea superiority into the twenty-first century.

In the Mine Warfare area, a two-year program has been initiated, the output of which will be an operational and technical baseline that will be used to initiate specific new generation mine developments.

Two surface mine countermeasure ships of the MCM-1 AVENGER class are under construction. This class of ships provides a much needed open ocean capability and will start to enter the fleet in 1985. Another new class, the MSH-1 CARDINAL class minesweeper hunter, is now in the final phase of contract design and is intended to be assigned coastal mine clearance missions. The lead ship will be awarded later this year and deliveries will commence in 1987.

C^3I AND SPACE PROGRAMS

Command, Control, Communications, Intelligence and related space efforts are of great significance to the warfighting ability of our forces, and in many ways produce a product which is difficult to quantify. In the warfare areas I have just reviewed, protection against a jammer, the ability to quickly assess sensor data from many sources and to provide combat direction to subordinates will add critically to the Navy's effectiveness. This has been well understood, has been emphasized by the President as equal in importance to the weapons and mission areas, and has been substantiated by each of the major studies I have outlined. The challenge, as we grow to a 600-ship Navy with a high degree of readiness and sustainability, is to make a well-balanced investment in the force multiplying area of C^3I related programs.

I would like to discuss four major thrusts of our C^3I program.

First is Wide Area Surveillance or the means of finding, identifying and tracking enemy and neutral platforms at great ranges from our own forces with as little time delay as possible, and with sufficient accuracy to target our weapons on the right platforms at the right moment.

Second, there is Electronic Warfare or the use of deception, decoys, sensor jamming and C^3 Countermeasures in a carefully managed way to dilute and reduce the effectiveness of the enemy forces arrayed against us. These first two areas were clearly identified as critical to mission success in the Outer Air Battle Study previously mentioned.

Third, there is Survivable Connectivity or the ability to transfer essential information with electronic and physical survivability to the fleet user.

Finally, I will describe our initiatives in System Engineering, by which we hope to meet both the maximum number of functional requirements with the minimum number of hardware or software developments, and ensure that all all signals and information exist in a synergistic way.

Our naval force today is forward deployed. Our forces are monitored by Soviet ships, by long range patrol aircraft, and by a number of space based surveillance systems. Soviet weapons have increasingly longer ranges, and in some cases they can be directed using data from overhead systems. Submarine-launched weapons can arrive from any direction. In the Outer Air Battle Study, it was determined that anti-air warfare effectiveness would be greatly multiplied if we could identify attacking forces at greater distances from the battle group center and direct our forces in a precisely tailored defense. The challenge is to provide tactical quality, wide area surveillance data directly to our forces at sea.

This past year we have continued our emphasis on a balanced electronic warfare improvement program. This effort, now in its second year, draws on the lessons learned from the Falkland Islands and the Israeli-Syrian encounters in the Bekaa Valley to develop a carefully structured improvement plan which will enable us to fully realize the force multiplication factor of EW. We are committed to a strategy to increase war-fighting capability and force survivability. The fundamental tenets of the policy--that the U.S. Navy will conduct offensive and defensive electronic warfare at every feasible level of the command and control, and communication and intelligence architecture of own and enemy forces--mandates balanced improvements in our EW investment strategy.

The essence of our investment strategy is to retain both the capability for close-in electronic point defense, and offensive EW, including counter surveillance, countertargeting, and counter-C^3.

To implement this investment strategy, we have initiated an aggressive EW program. Our commitment is reflected in the significant increases in the EW funding request. Both near and long-term actions are addressed.

Our near-term efforts include the Navy Cover and Deception program. We have also revised our program to provide the earliest IOC for offboard deception devices. In countertargeting we are developing the active electronic buoy, the chaff buoy, air deployed chaff and modification to existing fleet jammers. Airborne stand-off jamming is being improved by the EA-6B Advanced Capability program and the associated communications and data link jammer, the AN/ALQ-149.

Increased ship survivability will be obtained with the upgrade of the AN/SLQ-17A(V)2 and AN/SLQ-32(V) Anti-Ship Missile Defense Electronic Warfare Suites and their integration with the MK-36 Decoy Launching System. That system is capable of launching several types of decoys, and we propose to add the Active Electronic Decoy and the Counter-ARM Decoy.

Increased tactical air survivability will be obtained as a result of new and improved radar warning systems, such as the AN/ALR-67, and defensive countermeasure systems, such as the AN/ALQ-126B and AN/ALQ-162. The budget includes funds for completion of development and operational testing of the Airborne Self-Protection Jammer.

Long-term plans center around mutually supportive offboard and C^3 countermeasures developments. Through simulation we are devising the means to determine optimal employment of countermeasures in coordinated, multi-platform operations. Additionally, EW system technologies and techniques will be expanded to encompass additional portions of the electromagnetic spectrum to counter new threat advances. Both the tactical aircraft and battle group's effectiveness and survivability will be increased through the integration of complementary systems. The Integrated Electronic Warfare System (INEWS) is a joint program with the Air Force which addresses this integration. Through judiciously controlled development, divergent EW technologies and needs will be consolidated into a well-orchestrated, maximum offensive capability.

Today's Navy is critically dependent on communications. Yet the vast preponderance of our communications flow on "links" that can be jammed or are dependent on fixed land-based facili-ties that could be destroyed more easily than the forces they serve.

Our strategic communications program emphasizes survivability improvements in the communications equipment on our TACAMO aircraft, and expands the surviving and enduring strategic communications (STRATSEC) project. Employment of High Frequency (HF) equipment in special modes, and the deployment of reconstitutable Very Low Frequency (VLF) and Extremely Low Frequency (ELF) transmitters will assure connectivity in the trans-attack and post-attack periods.

Our Integrated High Frequency Program will develop a modern family of broadband, modular HF equipment for use on ships, aircraft and submarines. This equipment will use adaptive techniques for frequency selection and automatic message relay for intra-task force communications, and provide a long-range alternative to satellite or airborne relay for strategic or tactical functions.

Our Joint Tactical Information Distribution System (JTIDS), will provide higher data rates over shorter ranges and will tie together most Navy ships and fighter aircraft with our allies and with that portion of the Air Force fighters that are equipped with JTIDS. As you are aware, it was necessary to terminate the development contract for JTIDS to avert a major cost growth in Full Scale Development (FSD) and in production. We now have a contract with a cost ceiling for both development and production, and with clearly defined contractor responsibility.

Extremely High Frequency (EHF) SATCOM will provide a jam resistant link for long distance communication using Navy developed terminals and the MILSTAR satellite when it is deployed. To provide a means of testing the terminals and to provide an interim capability, we are also developing a space borne test and evaluation package which will fly on FLTSAT numbers 7 and 8.

Every signal that is emanated, every bit of information that is collected, and every piece of electronic hardware is a part of a system. A major effort is underway to treat every development in the Navy C^3I program as an element of that system and to drive a unified approach to all new developments.

With the rapid growth of computers in system development, software has become a major expense and major source of system engineering headaches. The Navy is now pursuing more than twenty command and control (C^2) systems which interface with one another in various combinations, and hold and manipulate data representing various aspects of the same universe. For the most part, these C^2 systems will use the same higher order language as Ada when implemented. Yet, unless some measures are taken to adopt a unified architecture approach for the entire system supported by a standard family of software modules, each of the C^2 subsystems will reinvent all of the software for its task.

Through the establishment of a C^3I system engineer within the Naval Material Command, and through a few pilot efforts such as restructured Naval Tactical Data System (NTDS), we are taking the first steps toward definition and establishment of a library inventory of standard software modular building blocks which can be combined in various ways to meet the functional needs of all of the many C^2 subsystems.

Recognizing the importance of the underlying computer technology in these systems and the rapid pace with which it is expanding, the Navy will begin a program in FY 1985 in cooperation with OSD and the other services to investigate and develop new approaches to the acquisition of military computers. These approaches will stress form, fit and function specifications and benefit from modern industry's computer technology. The outcome of this program will provide the Navy with the most advanced generation of military computers available starting in 1990.

Command, control, communications, intelligence and the related space efforts are as vital as ships and airplanes, in terms of contribution to success in fulfillment of the Navy's mission. We are striving to pull all the pieces together into a single effective system and to strike an optimum balance in our investment strategy.

AMPHIBIOUS ASSAULT AND THE MARINE CORPS R&D PROGRAM

Amphibious warfare is considered by many to be the most complex of military operations. One of the reasons for this is the enormity of the command and control required to assault a beachhead and establish a landing force ashore which can continue to fight. To the difficulty of commanding and controlling the landing force is added the necessity to integrate supporting arms to include air and naval gunfire. Continuous communications is required. The initial control of supporting arms for the amphibious operation rests with the Amphibious Task Force Commander (CATF) but as soon as he is able to exercise it, Commander Landing Force (CLF) requests that this control be passed ashore to him. This passage of control is normally done in phases. It is during this critical period that Command, Control and Communications (C^3) are most important and reliability becomes the most desired characteristic of our C^3 systems. I will elaborate more on our C^3 systems later.

The past year highlighted several efforts that will enhance our ability to conduct amphibious operations. The first of these is the continuing program for construction of amphibious ships and air cushion landing craft. The second is the upgrade of the Marines' amphibious vehicles. As a result of decisions and agreements by and between the Navy and Marine Corps and documented in the Department of the Navy "Long Term Amphibious Lift Requirement and Optimum Ship Mix Study", we have (1) identified and stabilized the 1990's lift requirements for the Assault Echelons (AE) of a Marine Amphibious Force (MAF) and Marine Amphibious Brigade (MAB); (2) developed a cost-effective, comprehensive shipbuilding plan for achieving the Defense Guidance mid-term objective for amphibious lift of a MAF(AE) and a MAB(AE) by 1994; (3) and established a balance of Landing Craft Air Cushion (LCACs) and helicopters for ship-to-shore movement to support the MAF and MAB objective.

LCAC. Our requirement for mobility in the amphibious assault must necessarily begin during the ship to shore phase. The LCAC will allow a rapid build-up ashore of combat power which is the single most critical need for an amphibious assault to be successful. The LCAC's high speed, 60 ton payload and 75 ton capability and ability to cross the beach and deliver its load to close-in sites will tremendously increase our amphibious flexibility. Since the LCAC will be introduced at approximately the same time as the USS WHIDBEY ISLAND LSD-41 Class ships, this one-two punch for the Navy-Marine Corps team represents a great step forward.

(U) LIFT REQUIREMENTS/JVX. With respect to our medium lift force, last year I indicated that the JVX tilt rotor development was vital to averting a shortfall in Marine Corps assault medium lift while providing Navy multi-mission aircraft for Combat Search and Rescue and fleet general support missions, Air Force Special Operations Force transports, and Army medium cargo lift aircraft capable of global self-deployability. JVX is a breakthrough development, combining helicopter hover characteristics with the speed, range and high productivity of turboprop transports. The Navy has moved our smartly since taking the lead in December 1982, awarding a 23 month Preliminary Design contract to the Bell Boeing team last April. We have now completed over 1500 hours in the wind tunnel with 3000 hours to complete in the next year. I am impressed that we are proceeding on schedule for the planned FY 1985 Milestone II Full-Scale Development decision and, as NASA's Deputy Administrator, Dr. Hans MARK indicated lat May before the House Science and Technology Subcommittee, are finding JVX to be relatively low in risk with no significant technological problems to date. The Navy is fulfilling its responsibilities to the other Services, developing common aircraft with a quantum increase in strategic mobility and tactical flexibility for conventional and special operations forces. This technology has great promise for wider usage than the 913 aircraft now planned. The Services are exploring new mission applications and the potential for derivative civil aircraft for the deep off-shore oil exploration and short-haul transport markets is significant. I am proud to report that the Navy is on course in the development of a unique National technology asset.

(U) CLOSE AIR SUPPORT. For close air support, the AV-8B carrier will be the keystone in the modernization of the Marine Corps light attack force, providing more responsive and effective close air support for landing force Marines. This modernization program will yield an all V/STOL light attack force of eight squadrons by the early 1990's.

(U) NAVAL SURFACE FIRE SUPPORT. At this point let me emphasize that it follows that if the Marine Corps is to continue as our Nation's force-in-readiness exercised through seapower, support from ournaval forces especially in the form of naval surface fire support is critical to our success. This support must be accurate, all weather and long-range. The reactivation of the IOWA class battleship returns to the fleet the large caliber guns which provide marine amphibious forces with a tremendous capability. The NEW JERSEY is currently demonstrating how effective naval surface fire support can be. Even the threat of the use of her 16" guns has great effect on our antagonists in Lebanon. To make the battleship even more effective, the Marine Corps has proposed improvements to the 16-inch ammuniiton. This program would entail development of an improved conventional projectile which deploys armor defeating submunitions. The Marine Corps continues to uspport other enhancements in naval surface fire support such as the SEAFIRE targeting system, the Semi-Active Laser Guided Projectile (SAL-GP), improved 16" ammunition (IOM), a large caliber gun system and a shipboard rocket system.

MARINE CORPS R&D PROGRAM

As we examine the Marine Corps role in our defense posture it is clear that the Corps is today, as it has been in the past, the nation's force-in-readiness. The events of the past year in Lebanon as well as Grenada point out that when the United States needs an immediate military response to a crisis, the Marines are ready. One of the primary reasons for Marine Corps readiness is its ability to task organize, or tailor a force to the mission. Another is the great flexibility the Navy-Marine team provides for global response. The ability of a Marine Air-Ground Task Force (MAGTF) to go anywhere in the world and sustain itself while projecting force ashore provides the necessary reach and muscle to lend credibility to our national diplomacy. Since we have adopted a national maritime strategy designed to provide the appropriate presence or show of force at key points throughout the world, it is imperative that our naval forces, of which the Marine Corps is an integral part, be maintained at the highest possible level of readiness. The combined arms capability of the MAGTF which has been demonstrated so well by our success in Grenada is a key element of the Marine Corps' basis mission - amphibious warfare. To successfully conduct amphibious operations, the Marine Corps must continually reevaluate its capabilities, doctrine and tools to do the job. To this end the purpose of research and development is to insure we are providing these MAGTFs the most up-to-date, effective and logistically supportable weapons and equipment we can afford. Thanks to our exceptional support in the Congress we have been very successful in this endeavor. Our primary interests are to enhance our means of getting ashore, our mobility once ashore, our capability to deliver accurate, coordinated fire support from our combined arms (air, artillery, naval gunfire) and our logistic support capability. To achieve improvements in all these areas requires wise application of alloted R&D funds.

The Marine Corps portion of the Department of the Navy total RDT&E Budget is approximately 3%. Since Marine aviation is a part of Naval aviation, funds for aircraft development are included in the Navy's RDT&E budget. The share of the R&D allocation is further kept to a minimum by joining with other services in mutually beneficial development efforts for common requirements. Marine Corps R&D strategy emphasizes low-risk, state-of-the-art technology, service life extension programs wherever possible and preplanned product improvements to systems that hold promise for potential cost savings while improving capability. In some instances because of our unique amphibious mission special Marine Corps requirements may call for a unilateral development effort.

As a prelude to discussing R&D programs that transitioned to production in 1983 let me say that without the full support of the Congress these efforts would not have succeeded. The High Mobility Multipurpose Wheeled Vehicle (HMMWV) is in production and is scheduled to be delivered in November 1984. The Logistics Vehicle System (LVS), the "Dragon Wagon", will provide additional logistic lift for our Fleet Marine Forces. The MULE is in the initial stages of fielding and was in use in Beirut. The SMAW has entered its first year of production and its initial operational capability (IOC) will be July 1984. A production contract has been awarded for the MK-19 MOD 3 40mm Machine Gun and the M60E3 Lightweight Medium Machine Gun. The AN/TPS-59 Radar Set and the LVT7A1 Service Life Extension programs are both in production now.

The FY 1985 Marine Corps R&D Program will continue to focus on the areas of firepower, mobility, command and control and combat service support, each of which is essential to the aforementioned amphibious assault.

FIREPOWER

INFANTRY BATTALION ENHANCEMENTS. Since our entire organization is based on supporting the Marine rifleman who must close with and defeat the enemy by fire and maneuver, improvements in our infantry weapons are considered by many to be the most significant. As a result of our participation with the other services in the Joint Services Small Arms Program (JSSAP), we will be fielding during this calendar year nearly all the new weapons which will give the infantry battalion a 25% increase in firepower. The M16A2 product improvement to the service rifle, the Squad Automatic Weapon (SAW), the MK-19 MOD 3 40mm Machine Gun and the M60E3 Lightweight Medium Machine Gun (fielded in 1985) are all JSSAP successes. We continue to pursue small arms improvements through JSSAP such as the Saboted Light Armor Penetrator (SLAP) ammunition mentioned earlier, advanced rifle concepts, machine gun developments and ammunition refinements. SMAW which gives us the bunker busting capability we have been without for some time will be fielded in July 1984. We will continue with preplanned product improvements to it, primarily in the area of accuracy and a family of rounds.

Mortars are the infantry battalion commander's personal artillery. We are pursuing a replacement for our 81mm mortar with the improved 81mm. At the same time, we have been evaluating the additional possibility of adopting a lightweight 120mm mortar. The increased range and effectiveness provided by the 120mm may offset a slight weight, size and logistical disadvantage.

ANTI-ARMOR.The Marine Corps will continue to review its anti-armor concept of combining light, medium and heavy systems for ground units to be employed in conjunction with laser guided munitions and aviation ordnance.

The Joint Army-Marine Corps Lightweight Anti-Armor Weapon (LAW) Evaluation completed Phase II in September 1983 and selected the Swedish AT-4 as the candidate LAW to proceed to Phase III. The Phase III evaluation is a 1000 round developmental/operational test (DT/OT). No commitment to buy AT-4 beyond this test has been made. This process is designed to identify the best possible replacement for the M72 LAW now in the inventory. Since none of the LAWs tested, including the AT-4 have demonstrated the capabilities either the Army or the Marine

Corps desire, another potential answer to the LAW selection question might be to product improve the M72. In conjunction with the Army we will be examining both AT-4 and an improved M72, referred to as the M72E4. While the Army emphasizes the lightweight requirement in a LAW, the Marine Corps desires penetration of a tank from all aspects as an important characteristic in the lightest weight attainable. Since we have found through our Joint Evaluation that no existing LAW will penetrate the front of a tank, we have decided to pursue technology which will improve the capability of the shaped charge concept of anti-armor rocket warheads. Two technologies show promise, an improved copper liner for the shaped charge and a depleted uranium hemispherical (DU Hemi) liner. These technologies would also be adaptable to an anti-armor round for the SMAW which currently employs only a high explosive round. Naval Surface Weapons Center, Dahlgren, VA will be examining both warhead technologies for the Marine Corps in this area.

Because the most effective weapon against a tank is usually another tank, it is important to maintain our Main Battle Tank Fleet at a level where it can defeat enemy armor. The Marine Corps plans to participate in the Army's operational test of the M1E1 Abrams Main Battle Tank and to conduct Marine Corps unique operational testing in an amphibious environment. If the results of this operational testing prove acceptable to the Marine Corps, we plan to procure the M1E1 Main Battle Tank. Our primary concerns are with the durability of the engine when operating in the extremely demanding amphibious assault where salt water spray abounds and in engine operations in the well decks of amphibious landing ships.

In order to provide our helicopter-borne forces a highly maneuverable, direct fire, protected anti-armor system that approximates the anti-armor effectiveness of the tank, our Mobile Protected Gun System (MPGS) program is being reevaluated. There is a possibility that the Light Armored Vehicle-Assault Gun (LAVAG) mission role vehicle may satisfy this need for a mobile anti-armor system that can be lifted by our helicopters. The Marine Corps direction in the MPGS/LAV-AG decision will depend somewhat upon Army intentions in the MPGS program.

The area of aviation ordnance continues to be of great significance to the supported infantry. Laser-guided bombs and Maverick, Hellfire and TOW II missiles, as well as the 25mm Multipurpose Gun, the GPU-5A 30mm Gun Pod and Gator mines are all critical to our anti-armor arsenal.

We also rely on artillery to assist in the overall anti-armor plan. The Copperhead round gives us the capability for a first round hit with forward observer controlled fire. And in a related area the Semi-Active Laser-Guided Projectile (SAL-GP) in development for the Naval guns that support the Marine Corps from the sea will add to our anti-armor punch.

ARTILLERY. In other artillery enhancements, a replacement for the obsolete FADAC ballistic computer is required for effective fire support. This system will be a computer-based fire control and communication system that will record, process, compute and provide tactical and technical information under manual control of entry, display and digital transmission of tactical and technical firing data from the battery to the individual artillery pieces. The Marine Corps has pursued development of the Artillery Computer System (ACS). It is a light, battery-powered computer based upon a modified Army device. Although the Marine Corps dropped out of the Army's Battery Computer System (BCS) to develop the ACS, the fielded and operational BCS is a candidate system to meet the requirement. Since the computer is only one component of the system, the larger size of BCS loses significance (105 lbs vs 20 lbs), and common support with the Army offers an advantage. The decision on which system to buy has not yet been made.

Remotely Piloted Vehicles (RPV) will help satisfy the Marine Corps requirement to perform reconnaissance, battlefield surveillance, target acquisition and radio relay providing near real time battlefield information without risking expensive manned aircraft. Other possible mission requirements include laser designation; nuclear, biological and chemical (NBC) detection; electronic countermeasures (ECM); electronic support measures (ESM); signals intelligence (SIGINT); suppression of enemy air defense (SEAD); sensor delivery and mine countermeasures. A low-cost, survivable unmanned aerial vehicle is required, and the planned acquisition strategy will take advantage of current RPV development programs. The present plan is to purchase an off-the-shelf system with a video sensor and radio relay equipment only to meet an FY 1988/1989 initial operational capability (IOC). The system to be procured will be chosen during operational testing of the available candidate systems. Other sensor or applications modules will be developed subsequently to fit the selected vehicle as required. The Congress deleted the FY 1984 funds requested for Marine Corps RPV program initiation because the Army had a similar development program (AQUILA) underway and instructed the Marine Corps to reevaluate that program. The Marine Corps monitored AQUILA during its development, and had concluded that the system was too complex, imposed a severe logistic burden and was too expensive. However, during the one-year delay in starting the program, the AQUILA system will be reevaluated. In its RPV program, the Marine Corps intends to capitalize on the other services RPV work and to investigate currently available systems and technology. Unless there is no viable alternative the Marine Corps does not intend to embark on unilateral development efforts.

The Field Artillery Rocket System (FARS) was conceived as a simple, indirect fire, multiple-launch rocket system that is mobile and helicopter transportable with the purpose of attacking area targets such as fire support units and forward air defense concentrations. It was initially designed as a trailer-mounted rocket launcher that would fire 24 5" Zuni rockets. A prototype was constructed and tested, achieving a maximum range of 16,400 meters. Because of difficulties encountered in modifying aerial fuzes for long-range surface to surface fires and the lack of an effective subminition, the Marine Corps is investigating the U.S. Army Multiple Launch Rocket System (MLRS) or variants of that 9" rocket system. Our primary requirement is for a lightweight, highly mobile system, requirements not unlike those of the US. Army's light divisions.

AIR DEFENSE. The decision by the Army to retain HAWK and upgrade it with Phase III PIPs has moved this program to the foreground in the Marine Corps. The Army will use a different HAWK configuration based upon its employment concept and its interface with the Patriot missile system. A Marine Corps unique R&D effort (entitled Battery Compatibility) was required to integrate the Phase III PIPs with the Marine Corps TRIAD configuration. This also allows the Marine Corps to maintain, to the greatest extent possible, hardware, software and training commonality with the Amry. IOC for the Battery Compatibility Program is FY 1987.

MOBILITY. If we are to keep pace with our principal adversaries we must be able to maneuver and remain highly mobile. As a part of the Marine Corps effort to improve in this area the LAV-25 with its various mission role vehicles will allow great flexibility in offsetting the tremendous armored mobility of threat forces. The LAV is a high priority program, not only because of the mobility it provides but also because of the additional support the mission role vehicles will give us. These helicopter-transportable, armored vehicles will enhance firepower, protection of personnel and tactical maneuver. Vehicle configurations still under consideration and operational testing are the Command and Control (LAV-C^2), Mortar Carrier (LAV-M), Recovery (LAV-R), Anti-Tank (LAV-AT), Logistics (LAV-L), Assault Gun (LAV-AG), and Air Defense (LAV-AD).

The LVT(X) is being developed as a replacement for the LVT7A1 family of assault amphibian vehicles when they reach the end of their service life in 1997. It will be optimized for combat ashore by improving firepower, armor protection, mobility and NBC protection leading to enhanced survivability. The LVT(X) is currently completing the conceptual design phase. Contracts for conceptual designs were awarded to Bell-Aerospace-Textron, FMC Corporation, and General Dynamics-Land Systems Division. Following evaluation of these designs, two of the three contractors will be selected to enter the Demonstration and Validation Phase of the LVT(X) program. The LVT(X) initial operating capability (IOC) was changed from 1994 to 1997 during January 1984 in order to get the maximum economical and operational life out of the LVT7A1.

COMMAND CONTROL AND COMMUNICATIONS

Tactical Air Operations Central - 1985 (TAOC-85) is being developed to replace the current Marine air command and control system which is based on technology from the 1950's and 1960's. The ground element of the Marine Air Ground Task Force must be supported by coordinated responses from the air element. This close coordination is only possible through the use of an air command and control system that can give immediate and accurate operational information to the air commander. The TAOC-85 system will incorporate current computer technology and communications equipment necessary to achieve the coordination required. It will have the mobility and flexibility of helicopter transportability and can be tailored to the size of the unit supported and the nature of the air threat. The U.S. Air Force recently joined this high technology program to meet their command and control requirement.

The Marine Integrated Fire and Air Support System (MIFASS) is being developed for both the ground and air elements of the Marine Air-Ground Team. MIFASS will provide a system which will allow effective operation, control and coordination of the delivery of mortar and artillery fire, naval gunfire and close air support. It will also be capable of conducting fire planning and managing target information. The MIFASS will also interface with other command and control systems such as TAOC-85. This is a unilateral development because of the unique requirement of the Marine Air-Ground Task Force to integrate the control and coordination of all supporting arms available to it. TAOC-85 will be the first host platform for the JTIDS terminal and 1991 is our target date for initial operational capability (IOC).

INTELLIGENCE

In the area of intelligence our efforts to enhance our capability continue with several intelligence programs designed to give our commanders more accurate and timely information with which to plan their concept of operations.

(U) The All Source Imagery Processor (ASIP) is intended for near real-time receipt and exploitation of digital imagery received from imaging sensors carried on Marine Corps tactical reconnaissance aircraft as well as imagery from theater and national sensors. The requirement for ASIP is distinct from that of the Army due to our need for tactical as well as theater and national imagery. Size constraints of available amphibious shipping require that the ASIP be smaller than current developmental Army systems. ASIP will replace the currently fielded Imagery Interpretation (II) and Imagery Processing (IP) segments of the Marine Air Ground Intelligence System (MAGIS). The heart of MAGIS, the Intelligence Analysis Center (IAC), is in production and will be fielded in FY 1985. The IAC will receive information from the other MAGIS subsystems, organic reconnaissance units, and external sources and process and correlate that information into useable intelligence. In addition to exploitation of tactical intelligence the Marine Corps is actively pursuing the Tactical Exploitation of National Capabilities (TENCAP). The purpose is to exploit the current and future tactical potential of national systems and to integrate these capabilities into the tactical decision-making process as rapidly as possible. The objectives of this program are:

- To expand and improve exploitation of national systems as a complement to tactical systems.

- To develop appropriate doctrine, training, force structure and systems.

- To establish collection system requirements that will benefit tactical forces.

MARINE CORPS STUDIES PROGRAM

Our studies and analyses are directed toward determining the best and most cost-effective ways to improve our organiza-tion, tactics, doctrine, plans, procedures, weapons selection and structure. Each study requirement is carefully reviewed to insure that only the essential ones are undertaken. The Marine Corps has no internal agency devoted to studies and analyses and therefore relies primarily on the Center for Naval Analyses and contract work in this area.

Before I leave my discussion of the Marine Corps R&D program, let me briefly comment on Beirut, Lebanon.

As the situation in Beirut developed, it became clear to the Marine Amphibious Unit (MAU) Commander ashore that the threat to his command required additional weapons and equipment beyond those normally found in a MAU. The result was a request for some development items and production items not yet fielded. In some cases such as the Shoulder Launched Multipurpose Assault Weapon (SMAW) which the Marine Corps is buying, the weapon is not ready for fielding and could not be provided. In other cases, after review of many helpful suggestions made by private citizens in letters sent to the Marine Corps, equipment was provided to the MAU in Beirut that is not on our table of equipment but was deemed necessary to enhance the protection of our Marines. The provision of the weapons and equipment was a conscious decision to provide the best possible support to the Marines in Beirut. At this point I would like to express appreciation on behalf of the Marine Corps for all the concerns expressed by the American people for our Marines in Lebanon. We have received many letters offering suggestions and recommending commercial items for use in improving the security and enhancing the safety of the MAU. This show of support and willingness to help in any way possible was a great encouragement.

SCIENCE AND TECHNOLOGY

The Navy's science and technology program is designed to satisfy the needs of the fleet by stimulating new concepts, assessing emerging technologies and providing the vital transition from research to useful naval applications. The science and technology program has both long range generic and shorter range specific components. Thus the program's management strategy balances a broad-based core program with specific focused studies. Specific science and technology initiatives for FY 1985 emanate from three Navy studies that were prepared this past year. Those studies are: (1) ASW Investment Strategy Assessment, (2) All-Weather Medium Attack Aircraft Blue Ribbon Oversight Committee Study, and (3) Outer Air Battle Study.

The ASW assessment has resulted in a management decision to accelerate FY 1985 investment. The level of effort within other program elements will remain nearly constant or experience modest growth. However, within these other elements, resources will be concentrated on needs identified in the other two studies cited above.

Based on the ASW study, the budget request rebalances ASW sensor investments among surveillance, surface, submarine and air platforms, and also between active and passive elements. Additional funding is being directed toward major improvements in the next generation torpedo--for improved propulsion, guidance, and warhead capability.

The Blue Ribbon Oversight Committee Report on Strike Aircraft recommends high payoff technology base efforts with application to the development of a new attack aircraft for the mid-1990's. Developments which support this aircraft include maturing the technology for wideband multimode common aperture electron devices and countermeasures, for VHSIC use in signal processing, and for composite materials.

The Outer Air Battle Study clearly expressed the need to further exploit technologies related to wide area surveillance, electronic warfare, and other areas in which possible solutions might be found. The Soviet long range air threat is real and evolving. Our technology base thrusts are tailored to be responsive to the growing challenge.

The exploratory development program contains a long-term joint effort with the Department of Energy to develop advanced computer technology through the S-1 project at Lawrence Livermore Laboratory.

The Navy is fully supportive of and has established an internal management structure to accomplish the President's Strategic Defense Initiative.

CONCLUSION

Mr. Chairman, in my statement today, I have set forth our goals in Navy Research and Development; I have adressed some of our efforts toward achieving these goals along with the progress we have made; and I have touched on some aspects of how we conduct business.

I am convinced that the FY 1985 Budget request is needed to support a firm well-planned program which, if approved by Congress, can be efficiently executed by the Navy.

I thank you for your support in the past and request your continued support as a partner in FY 1985.

Senator COHEN. Admiral Baciocco?

STATEMENT OF VICE ADM. A. J. BACIOCCO, JR., USN, DIRECTOR, RESEARCH DEVELOPMENT TEST AND EVALUATION

Admiral BACIOCCO. Good morning, Mr. Chairman.

I have been in my present assignment since last fall, when I returned to Washington from the sea, as Commander of Submarine Group Six in Charleston. Thus, it is a distinct privilege and pleasure for me to appear before you today for the first time.

I want to pick up on just the highlights of Secretary Paisley's statement in the record, and what Mr. Cann has discussed in his overview, and relate those to the RDT&E budget request which you will receive from the Navy this year. This request is well aimed and fully supportive of the Department's mission in support of our national defense effort. The most prominent aspect of the Navy budget request is the funding for the Trident II/D-5 missile system, $2.1 billion in fiscal year 1985.

The R&D account for the past 7 years and the growth mostly reflects our investment in the Trident II/D-5 missile. If you consider the R&D account exclusive of the Trident II funding, you can see the dollar request remain nearly constant.

So the percentage of the Navy's total obligation authority for research and development actually decreased until fiscal year 1984. This was a conscious decision made by the Department in the early eighties to start a building program toward a 600-ship Navy, and at the same time increase our fleet readiness and sustainability.

Having now achieved that, we are requesting your support to return to an appropriate R&D level of effort, which historically has been approximately 10 percent of Navy total obligational authority, so as to sustain our qualitative advantage and provide the 600-ship Navy the capabilities we feel it will require.

Our resource allocation, which for clarity is divided into four major subdivisions: Trident II, development, our technology base, and management support. By far the largest of these, 64 percent of our RDT&E budget is development, in which we conduct advanced and engineering development of our major systems. In fact, the 22 percent dedicated to the Trident II effort is also development.

This factor, the fact that several of our large tactical programs, such as the MK-50 advanced lightweight torpedo, are in full scale development, and our requirement to develop the most advanced technologies available for DDG-51 (the *Arleigh Burke* class destroyer) our new design SSN, our F-14 improvement program, as well as other major platforms, account for the growth in development which you perceive in the fiscal year 1985 budget request; 8 percent of our budget supports the technology base where our future capabilities are derived. Our technology base program has both a long range core of basic research efforts, and a relatively shorter range set of specific projects within what we call exploratory-development.

Our technology base program for 1985 reflects several targeted growth areas addressing urgent needs in undersea surveillance and undersea weaponry. Specifically such areas as large submarine arrays and improved torpedo propulsion, guidance, and warheads will receive increased and focused emphasis.

The 6 percent for management support funds our manpower engaged in our laboratories, our R&D ships, such as the U.S.S. *Norton Sound* and U.S.S. *Dolphin,* both research vessels dedicated entirely to R&D, and our aircraft and other support such as ranges, R&D facilities, centers, and laboratories.

In Mr. Cann's statement, he cited several management initiatives implemented within the Department to make sure that we live up to our responsibility to be good stewards for the trust which you, the Congress, and the people of the country placed in us.

TOMAHAWK PROGRAM

Senator COHEN. About the Tomahawk program—I read something just 2 or 3 days ago about the substantial cost growth in the Tomahawk program.

Mr. Cann, are you familiar with the cost growth or the cost overrun, whichever you want to call it, in the Tomahawk program?

There was an item in the New York Times or the Washington Post in the last 2 days—it is not something new—an article about the Tomahawk program being substantially more expensive than originally anticipated.

I was just wondering how your management programs have dealt with that.

Mr. CANN. In the case of the Tomahawk program, it was certainly a major problem. The difficulty was the program was essentially given back to the Department of Navy, from the Joint Program Office instead of being handled as a joint program through an executive committee. We changed program managers, and Admiral Hostettler has taken that program over and spent a considerable amount of time restructuring that program, putting that program together again. The current program, we feel, is being well-managed and is moving smartly toward its objectives.

There is no question that the program had major cost growth, major technical problems, and other major problems, but we hope those are all behind us at this point.

Senator COHEN. Haven't we dealt with that by just reducing the buy from last year?

Mr. CANN. There was some reduction in the buy, but the reduction was because we felt that the system was not ready to ramp up into full production. There were some issues that had to be resolved.

Admiral BACIOCCO. We deferred the program production increase until we continued testing to assure ourselves that the quality of the missile then being produced by the contractor performed satisfactorily. We have completed the operational test and evaluation on the submarine launched version of Tomahawk, and we are currently going through the final phases of the test and evaluation for surface ship version. We think that our problems are behind us.

Senator COHEN. Why don't you continue.

ACQUISITION MANAGEMENT INITIATIVES

Admiral BACIOCCO. With your permission, Mr. Chairman, prior to proceeding to the new design attack submarine, I would like to spend a few moments to highlight some of the recently instituted acquisition management initiatives not described previously by Mr. Cann.

The results of several of our changes are evident for the first time in our fiscal year 1985 budget request. On the paperwork side, we have reduced the number of directives governing the RDT&E process and have simplified their content, allowing program managers more time to concentrate on running their program, and less time on paperwork and reports.

We have implemented new procedures that govern how we start a new program. These procedures require careful definition of what the program is to develop along, with an upfront consideration of affordability—that is, the cost to develop, procure, and maintain the system. Each new program responds to a formally validated operational requirement.

The program plan that determines how the development and production of the system will progress requires test and evaluation periods that precede and directly influence each decision to proceed to the next phase of development or to production. In the same vein, the concept of an orderly transition from development to production, stressing a phase rather than a single point has been instituted.

Strict compliance with specific criteria is now required after decision to start full-scale development, Milestone Two, to ensure that the programs that do not meet these criteria do not proceed further into development, and thus large expenditures before they are ready.

We examine the program critically using testing and analysis to ensure that engineering effort is justified, that we are pursuing the best approach, and that the cost schedule estimates are valid and acceptable.

Dedication to full-funding of each program is manifested in the reduction of the total number of on-going projects, as Mr. Cann mentioned, down to 532 in fiscal year 1983 to 421 submitted with the fiscal year 1985 budget request. More importantly, the commitment to full funding has influenced a greatly reduced number of new program starts.

Budget year new starts are down from 54 in fiscal year 1983 to 10 proposed in our current budget request, 7 of which are actually product improvement and not new development programs. In addition, the total number of new starts proposed across the 5-year defense plan has been reduced from 97 in fiscal year 1983 to 48 in fiscal year 1985.

The total has also been more evenly programmed across the 5-year period, rather than being heavily loaded in the first 2 years, as you can see was the case in the past. This means that we are able to program the resources at a more efficient rate to the programs we have chosen to develop.

The point in going over this, sir, is to emphasize that we in the Navy RDT&E business and in the acquisition business have taken these management initiatives seriously and applied the concepts stringently to enhance the stability of our R&D program across the board. As such, we believe that the fiscal year 1985 RDT&E budget that you have received from the Navy this year contains important programs which are stronger and more executable than perhaps in years past.

Mr. CANN. Mr. Chairman, we are now prepared to proceed with the new SSN effort.

Senator COHEN. Thank you very much. Admiral Thunman will make that presentation, is that correct?

Mr. CANN. Yes.

Senator COHEN. Why don't you come forward.

Mr. CANN. We had thought that Mr. Polmar and Dr. Friedman were going to make their presentation first.

Senator COHEN. Are you going to save your testimony until last, Admiral?

Admiral THUNMAN. I would like to follow them.

Senator COHEN. Mr. Polmar and Dr. Friedman, it may be preferable to have you sit separately rather than as a panel, but I will let you decide—whatever you are comfortable with.

Why don't you listen for a moment. I intend to read Senator Hart's questions, and I think that they may present a framework for you to discuss either your support or your qualifications about the program. I think the questions will pertain to those that we might raise on the subcommittee.

Senator Hart would like to have any of the witnesses respond to the following questions:

First, does the Soviet Navy depend on a single SSN design, or does it pursue a number of different courses simultaneously?

Second, if the proposed new design SSN should prove an inappropriate design by the late 1980's or early 1990's and we have no alternative design available, how seriously could our maritime supremacy be threatened?

Third, if we find ourselves facing a "dogfight" submarine-versus-submarine environment by the late 1980's or early 1990's, how appropriate would the proposed new design SSN be? If it would not be appropriate, why?

Fourth, what would be the characteristics of a submarine optimized for a "dogfight" environment?

Fifth, could such a submarine be smaller than the proposed NDSSN? Could it cost less, so as to be affordable in greater numbers?

Sixth, do any foreign navies build SSN's smaller than our SSN-637 class?

Seventh, what are the disadvantages of large size in an attack submarine?

Eighth, in your view, should we have a parallel design effort—parallel to the NDSSN effort—to design a nuclear-powered attack submarine optimized for the "dogfight" environment, smaller than the SSN-637 class, and costing no more than half as much as the proposed NDSSN?

Ninth, could we find ourselves, by the late 1980's or early 1990's, needing to build both the NDSSN and a smaller, less expensive SSN?

There is another question for Mr. Polmer which I will reserve until such time as he testifies.

Dr. Friedman, I have read your written statement, and I think most of it is designed to respond to questions such as these.

You may summarize your written statement, or proceed as you see fit.

STATEMENT OF DR. NORMAN FRIEDMAN, Ph.D.

Mr. **Friedman**. Thank you, sir.

I appreciate the privilege of appearing here. Actually, my statement was made before I heard the questions, and I don't have a copy of the questions in front of me.

Senator **Cohen**. I am going to have a copy given to you so that you might respond.

Mr. **Friedman**. The issue in the U.S. submarine force, basically, has always been whether we rely on numbers or whether we rely on unit quality.

The first point that I would make is that the navies differ quite a bit in what they need in their warships, and it is extremely dangerous for us to look at any foreign navy, including the one that we are probably up against, and say, well, they do X, why don't we do X.

Their requirements are different from ours. If you look ahead into the future, and you ask what the U.S. Navy is supposed to do in the future, one of the conclusions you reach is that in many cases we will be going up, not against the Soviets, but against Third World powers of various sorts. The reason is that nuclear weapons are very likely to deter a large war against the Soviets, whereas the Third World, as we all know, is a very turbulent place.

Recently, even the Soviets have not controlled the Third World countries. I think the most important lesson in the Falklands was that two countries, nominally allied—Argentine and the British both are in a Western, shall we say, loose coalition—can fight each other.

That says that the U.S. Navy, limited to 600 ships or fewer—that is a limitation, not an enormous number—has to be extremely flexible. So the question that comes up is, if you are building a navy, if you know that there is only so much money in the pot, as there is, what sorts of ships do you buy?

The U.S. choice historically has been to prefer large, highly capable, individual units on the theory that if you buy larger numbers of smaller ones, among other things, the cost goes up in the end.

If you think of a submarine operating in a port area in the presence of Soviet submarines, then you know that it will be outnumbered. There is no possibility whatever that any nuclear submarine you buy will be so inexpensive that we will match Soviet numbers. It is impossible. Therefore, you have to get the most out of that unit. Historically, our choice has been to try to put the performance in the weapons, to try to get that submarine to deal with as many other submarines as possible.

As far as "dogfighting" goes, you have to think of exactly what circumstances this is supposed to occur in. Now, what is it that our submarines are doing? They are going out hunting Soviet subs. The object of the Soviet submarine force will be to get out of Soviet waters to hunt our surface ships. They are not terribly interested in dealing with our submarines, except in order to avoid that damage, so that they can get out into the open ocean. Under those circumstances, are they going to "dogfight?" No. Their objective is to get things out of their home waters, or to dispose of our submarines while they can.

Under those circumstances, it is going to be the survivability of the American submarine, and the issue is going to be how many targets they can take care of as those targets present themselves very rapidly.

If you look at the new proposed submarine, you are looking at greater salvo size, higher computer capacity. You are looking at an attempt to deal with multiple targets at the same time. Incidentally, this is very much the same philosophy that you are seeing in Aegis and the F-14, the idea of putting your money in the weapons. The weapons are, first of all, much easier to change.

One of the questions that Senator Hart asked is: What happens if the submarine doesn't work by the 1990's? What does "if it doesn't work" mean? How do submarines fail?

First of all, you hardly ever hear about any warship design in any navy failing, and that includes some that most naval architects would regard as unbelievably incompetent. Failure usually means that the ship breaks in half, or something like that. Submarines don't do that.

NEW DESIGN SSN

Senator **Cohen**. I don't have the question in front of me now because it is being copied, but I don't think that was the nature of the question. I think his question was: Suppose that by the late 1980's or early 1990's you find that, because of Soviet improvements or other developments, the new SSN design is inadequate to meet that kind of a threat?

Dr. **Friedman**. Let's look at the improvements. The main improvement is going to be quietness. The sub is going to get a whole lot quieter. If they get a whole lot quieter, the only way that you are going to beat that is either better signal processing, which means a bigger computer in the sub, or you are going to get an active sonar. If you use active sonar, the tactic is going to be to ping and then leave where you have been so that he doesn't see where you were.

If you want a good active sonar, it is going to be a low frequency sonar, and it is going to be big. All the ways that submarines get better, unfortunately, mean bigger. If you make them small what happens is that you don't have enough space for those sensors. If you want better in terms of weapons, if the Soviet sub is faster so that the MK-48 torpedo doesn't work any more——

Senator **Cohen**. Why don't you stop here for a moment. I have to catch this roll vote, and then will return. This meeting will stand in recess for about 10 minutes.

[Recess.]

SOVIET SUBMARINE DEVELOPMENTS

Senator **Cohen**. Dr. Friedman, why don't you pick up where you left off, and anticipate the kinds of developments the Soviets will make or are likely to make between now and the 1990's.

Dr. **Friedman**. The usual developments that you can foresee in submarines themselves would be quieting, so that they escape us; higher speed to escape, have better tactics, and have higher maneuverability on their submarines; perhaps a small size in their subs to get a smaller sonar cross-section; things of that sort, and the question is, how do you beat those things? Those things mostly involve, it is harder to find the Soviet sub.

The way that we have progressed up to now, and the way I believe it would be best to keep progressing, is better sensors on our part. How do you get a better sensor?

You go to lower frequencies, by and large, which means bigger sonars. You do better signal processing, which means bigger computers inside your sub. You probably have a lot more weapons because the capability per weapon is probably lower, if they do better. You want more space inside the sub so that you can use different weapons.

All of those things add up to a bigger platform on your part. If you look at shipbuilding costs in general, the things that dominate the cost of the submarine, or any other surface ship, are more the electronics and what they call the combat system than the size of the sub itself or the size of the ship. So historically, the cost doesn't go up in proportion to the size. Similarly, if you try to squeeze it down in size, you don't get commensurate savings.

SOVIET SUBMARINES

Now, let's talk about the Soviets and what they have. It is absolutely true that the Soviets build a remarkable variety of different kinds of subs. They build much more specialized subs than we do. They have a higher construction rate. Their subs, I suspect, cost them less because there is poorer quality control on the whole. They have had some embarrassing incidents. For example, the *Victor* that didn't quite notice the carrier coming right overhead will be somewhat embarrassing. That was last week in the South China Sea.

Senator **Cohen**. Is it embarrassing to the Soviets or embarrassing to us, in that we either didn't detect it or didn't make it stay away?

Dr. **Friedman**. We detected it at greater range. If it had been a war, we would have attacked it at greater range. It is not a war. You can't say to a submarine, no, no, we don't like you, don't come near us.

In peacetime, before World War II, the main way that submarines got themselves sunk was by coming up shallow when a surface ship was around that happened to hit them. As a submarine commander, my understanding is that you are rated on your ability to look around when you come up to periscope depth.

The odds on detecting a submarine very close to a surface ship have never been terribly good because of the way sonars work.

Senator **Cohen**. Are you saying that as they come closer, they are harder to detect?

Dr. **Friedman**. What happens is that with most sonars, the beam of the sonar slopes downward. If you are out here, coming in, the sonar gets you like that. If you come closer in, you are in this dead area. That is why many ASW weapons are designed to hit at fairly long ranges where the sonar catches the sub. It is a peculiarity of those sensors.

In World War II, for example, the way you estimated the depth of the sub was that you were coming toward the sub when he vanished from sight. There was a rule of thumb that indicated his depth, because you knew the slope of that beam. It is a peculiarity.

Most of their subs perform different kinds of jobs, so you are not looking at three parallel designs for the same job. For the first time now, it looks like you are looking at more expensive and less expensive designs that might be parallel. I am thinking now of the newly announced new design titanium attack sub, *Mike,* and the somewhat cheaper attack sub—that is fairly large also, by the way—called *Sierra.* In the past they have not done that. It is not clear to me whether we won't discover fairly soon that those two things are not for the same job either. I should point out the el cheapo submarine is not very cheap.

As far as foreign subs——

Senator **Cohen**. Would you go back a moment. You said that the *Victor* was an embarrassment. Was it an embarrassment in terms of the quality of the ship, or an embarrassment in terms of the quality of the captain?

Dr. **Friedman**. You can't tell. You won't know until you read the court martial, which Russia will not be releasing. You don't know whether the sub had bad sensors or that it is so noisy that he couldn't hear anything coming. A carrier is supposed to sound like an express train rumbling overhead.

When he got that close, he was in danger. Typically, if you are a submarine commander, you are trying to see without being seen, and also you are trying to see without being collided with. Whether it turns out that he was personally stupid, or whether he had a bad ship, I can't tell certainly, and I doubt that anyone else can. In those cases, navies usually send him away for conduct unbecoming.

SMALLER NUCLEAR SUBMARINES

If you look at other navies, question is: "Do they have smaller nuclear subs than we do?" There are two other navies with whose nuclear subs I am fairly familiar, that is the British and the French. The Chinese also have nuclear subs, but I don't know enough about theirs to make intelligent comments.

British nuclear sub technology is pretty much like ours as far as I can tell. Their nuclear subs fall somewhere between the 637 and 688 in size. They recently published an account by one of their submarine designers of their nuclear submarine development, and it is fairly clear that the size of the subs is determined by the things that we care about—silencing, sensor capability, combat system volume.

They have not been able to buy a bigger enough sub to get very many more torpedoes than we do. It is my understanding that one of the values of the new sub is more tubes and a lot more torpedoes.

Now that leaves you with the French, and it is true that the French attack subs are substantially smaller than anyone else's. I have no intelligence data on this, so I can speak unclassified. I can tell you that a British submarine designer commented that the French subs were a lot noisier, and that the reason the French were building them smaller was that they weren't caring so much about silencing.

I think that it is fair to say something about silencing and why the subs get big.

NUCLEAR VERSUS DIESEL SUBMARINE

A nuclear submarine differs from a diesel submarine in a fundamental way. In a nuclear sub, whenever that reactor is running, machinery has to run. There are pumps that run the water through it. There are generators that run the pumps. There are all kinds of things that are a source of noise. The early nuclear submarines were incredibly noisy. There were stories that they could be heard many miles away, farther away than anyone believed.

In order to prevent that, what you do is you sound isolate your machinery on the rest of the sub. Again, I don't have U.S. sources on this, but a British engineering vice admiral gave a very full account of British technology, which I understand is not totally dissimilar to ours, in a public lecture a few years ago. He talked about how you had to mount the machinery rigidly on separate racks inside the submarine and suspend it from the hull just to keep the sound from getting out.

Accounts of the U.S. submarine production programs talk about the fanatical attention to detail to make sure that short circuits were not left where sound could get out. The bigger the sub, the further the machinery is going to be from the outside. You want machinery to be very quiet, you have to cover it. You have to make pipes that don't buckle when the thing dances around a little bit. It is a very elaborate process, and at every stage you are talking about trying to keep the noisy pieces inside, away from the outside of the submarine.

The Soviets, until recently, looked as though they didn't quite feel that was worth the trouble. However, if you look at the latest Soviet attack sub, *Victor III,* perhaps you will remember that it has a little pod on the top of its fin, and last year we announced that the pod had a towed array of the same kind that we use.

Why should we care about that, because the Soviets don't know how to process signals terribly well? The reason we should care is that that is the way we detect them, therefore, once they start using that kind of stuff, they begin to understand what we care about in submarine design, they begin to understand why the silencing really matters. Now they have a way of measuring just the kind of noises we have been using to catch their subs. That says to you that the future will have a lot quieter Soviet subs.

I don't know if the future is quieter in the next class, or quieter in the class after, that is a matter of very subtle kinds of intelligence that I am not privvy to. But the writing is on the wall that says that we have to worry about better sensors ourselves, and worry a lot. No. 2, it says that we have to quiet ourselves because their sensors will be improving. It is a double game.

Now, the disadvantages of large size in any ship are obvious. They cost more per ship.

DOWNSIZING SHIPS

Senator **COHEN**. I thought you said one would probably not save money by downsizing ships.

Dr. **FRIEDMAN**. You will save a little, but not as much as you would hope. The experience of trying to go to smaller designs in other categories of warships is very depressing. I spent a lot of time following the designs of American surface warships, mostly using internal Navy documents.

I would say that, for NAVSEA, that they didn't make any attempt to control what I say, except that they don't want me to give away national secrets.

What you see is that they try again and again to find some way out of the increased size and cost. They feel almost frantic about it at times—we are talking over a period of 60 or 70 years—and they are stuck. In many cases, a ship which appears to be very large from the outside turns out to be a very tight design, and it is sort of bizarre to watch. Someone will say: "Look at that aircraft carrier, 80,000 tons." Then you will notice, when they are designing it, someone will say: "Look, we wish that we could go to 10,000 more, but we can't have that." You can see why, because you are looking at their internal technical discussions.

Others have tried to go down. The British have tried pretty hard in carriers to make one that displaced 50,000 tons. I knew its designers personally, and I spoke to them. They kept saying again and again that it was the most unpleasant experience of their lives to try to make it small. When it was canceled, it was the happiest day of their lives because they were sure that it would have been a disaster if it had been built. This has actually come out in print.

What I am saying is, I don't like oversized, expensive ships any more than the next guy, but the more that I look at the technical records, the more I see what they say when no one is watching, the more I get the feeling that you get stuck.

As far as a parallel effort goes, the question is where you want to put your money. The national philosophy in defense is going to be to put the performance in the sensors and the weapons rather than in the platform. You will make the best platform you can, but you are putting your money in other things with very high performance, and the parallel design effort, if you want to make a parallel design effort, is going to be sensors and weapons, and not the overall submarine. The overall submarine is a very basic sort of thing.

I don't know enough about the MK-48 ADCAP. I don't know enough about whatever other torpedoes Mr. Cann has in mind when he talks about advanced development, but that is where the high performance is going to end up. If there is a disaster in a submarine war, that is the disaster, and not the submarine proper.

I will close with a historical comment. Before World War II, we spent a lot of time developing subs. The main problem in that development turns out to have been the diesel engines. The early diesel engines were terrible. By about 1940, they were very good. We had very large submarines, and they were quite successful. There was exactly one disaster in that war, and that was that the weapon didn't work. The sub worked beautifully.

There was an attempt to go for smaller subs, and the submarine community at that time rejected it on the grounds that they didn't know what sort of war they would have to fight and that flexibility really mattered.

We are about the only global Navy in the world right now. Everybody else has limited missions, but we don't. We are stuck with that. I am glad that we are stuck with that. I would rather that than be somebody else's quiet state.

Having a global mission means that you can't specify in advance exactly how your forces will be used, and that is a terrible burden. It means that you can't have a simple national strategy, because we can't say that we know what the next war is going to be like.

The war that we talk about is the one that is the least likely; it is a terrible war. The wars that are more likely are wars which press us in different ways. To the extent that you can't have a definite idea of the future that way, you can't optimize, and that means that you have to spend extra money. In my view, respectfully, it is something that we are stuck with—geography and history; the Russians don't have that problem.

Senator COHEN. Are you saying that, since you can't anticipate what the nature of the conflict is going to be, or where it is going to be, that if you prepare for the worst, you are therefore prepared to do something less? Does that follow?

Dr. FRIEDMAN. In some senses, yes, and in some, no. For example, supposing you believe that the worst is a nuclear holocaust, and supposing you were a believer in civil defense, and you believe that the way to handle that is space defense and putting the whole country under 1,000 feet of concrete, or things like that. Well, that worse has very little to do with, say, the Iran/Iraq war, Lebanon, or any of those other places. It is just not the same kind of war.

In the case of naval forces, submarines play a varying type of role in the different kinds of wars that I can envisage. It is quite clear that against a lot of kinds of forces, you can buy cheaper. The trouble is, once you buy in naval forces, you don't have enough ever to say: All right, you are the Second World force, and you are the Third World force. We just don't have enough, I wish we did. I like the Navy very much, and I wish it were about three times the current size, but I know that no one is ever going to give me that.

Senator COHEN. Secretary Lehman is working on it.

Dr. FRIEDMAN. That is why I have a little picture of him in my study.

"DOGFIGHTING" CAPABILITY

Senator COHEN. Why don't we come back to the dogfighting question that Senator Hart raised. Is this new SSN design the optimal design for dogfighting capability?

You indicated before that this is an unlikely mission for the Soviet submarine force. It might be an incidential, but not a major scenario.

Dr. **Friedman**. Yes, I believe that.

Senator **Cohen**. If it turned out that the Soviets were producing so many that they decided not only to try and get past chokepoints, but actually have them out there to try to sink our subs, would the new design sub be an optimal design for dogfighting?

Dr. **Friedman**. People who talk dogfighting usually are talking in terms of the smallest possible platform, so that it is highly movable with automated controls, so that when your ship goes down, it doesn't go down so far that you never get back up, lots of weapons that can be fired at short range.

The trouble with dogfighting is that it is not quite analogous to an airplane. In an airplane, you can see the other fellow very far away. He can see you. You know what is going on. As you get closer, you can tell that it is the enemy and not us. You hear about the dogfighting in Vietnam, and why did they always close at short range, because you are afraid that you will shoot down your buddy from the next squadron.

In submarines, the only reason submarines are any good at all is that they are invisible, basically, and everything stems from that. Now, to the extent that they are invisible, to that extent, if you are close-in to another sub, and that is the first time you see him, I am not so sure that you can tell whose he is. It means that you can't buy a lot of submarines that operate close together to start shooting it up. That is why I think that dogfighting is difficult.

On a 1-to-1 basis, you will do your best, but the dogfighting sub that I described is relatively noisy because the machinery is close to the hull. The weapons can't be all that good, you don't have much space internally for fire control. One has decided that you are not going to shoot far enough away, so you don't worry too much about fancy sonar or things like that. It is basically a very, very limited animal, and it is a sort of desperate thing to use.

If you think about what the Soviets are in this game for, there are two things that they want out of life. One is that we don't harm their strategic assets, which is their ballistic missile subs. Whatever our views, they are going to believe that we are after that. It is the only naval asset that they care about.

The second would be for them to want to take out the vital shipping across the Atlantic and Pacific. We are a maritime power, we are a maritime alliance, and if NATO, God forbid, is fighting a war in Europe, somebody has to keep pouring in the goods, otherwise they fold.

For the first job, you have to find us when we get in, and for that they need better sonars, better sensors. The noiser their subs are, the happier it is for us. We will just be quiet, and let them detect each other.

For the job of getting out into the North Atlantic and shooting up convoys, or carrier groups, or whatever else they want to kill, then the objective will be for them to get out into the open ocean. It is our job, as I understand it, to make them be the ones worrying about us. To the extent that we can do that, to the extent that very capable subs in relatively small numbers can deter them, frighten them, cause them to expend their energies unproductively, that helps us enormously. The more they feel that it is hard to catch us, the better it gets.

Senator **Cohen**. Let me just summarize by what I think you said in your prepared statement. You think that, one, speed is important in submarine warfare; two, quieting is important; and three, submarines ought to carry more weapons.

Dr. **Friedman**. Yes.

IMPROVED SSN 688

Senator **Cohen**. Let me ask you whether or not you think the improved 688 would be an adequate substitute for the new design.

Dr. **Friedman**. As far as I understand it, from what I have seen—let me say something first. I am not privvy to a lot of U.S. submarine information, therefore, I am very much aware of general issues. I could not off the top of my head, for example, draw you the noise spectrum of the sub or something like that.

It is my understanding that the improved 688 reaches about the peak of what you are going to get out of silencing. That engine was designed originally in the late 1960's. It represented what they could do then. If I am right about what it takes to quiet a sub, you need more diameter to get much more out of it.

As far as weapons go, the only way you are going to get more weapons on that sub is the vertical launcher. Traditionally, submarine people much prefer to be able to maintain their weapons and to get at their weapons while they are underway. I know that in World War II, the main navies used external torpedo tubes and they were highly disliked, and the main reason was that the torpedoes deteriorated in the tubes.

I get the impression that the vertical launching tube is a compromise that isn't that well liked in the sense that it would be nice to be able to get at the weapons and maintain them while you are underway.

The improved 688 will be somewhat slower than the new one. How important the difference of x knots is depends upon your study of tactics. I can leave that to submarine people to say how desperate they are for that extra speed. That would get into operations analysis that I have not done.

It would be fraudulent for me to say that because I read this study or that study, I believe. What I am giving you is what I get out of my studies. Studies, as you know, can prove anything.

The sub is different because you get more shots, and they are apparently beginning to believe that more shots matter a lot. Right now you get four shots, and they want more. If you believe that four shots, two on one side, don't give you enough chance of killing something that is coming at you, that is your insurance against future developments. You want more chances to kill a given target.

As far as numbers of weapons, you are roughly doubling the number of weapons. Again, if you think that the submarine's job is to try to wipe out large masses of Soviet subs as they pour out into the North Atlantic, then you want him to stay out there as long as he can. In a target-rich environment such as that, you are limited more by your number of torpedoes than by how long your crew can stand it or anything of that sort.

The only similar example I can think of is the German U-boats. In their happy time in the North Atlantic, you would have cases of U-boats just running out of torpedoes, and to replace anything in a submarine at sea is a very tricky proposition. The Germans tried with generally fairly bad results, and I think that we would not even try.

The question really is, you will get some better silencing out of it, but you are reaching the limit. Is this the time that you want to go for the new one? That is a judgment. One of the problems that you have in any judgment of this type is that deciding that you have just about rung out the last bit you are going to get is a judgment call. I will defer to the naval types, but I will just tell you that it looks like it has been a long time since we tried something new.

The reason that we go multi-purpose is that we don't have the numbers. If you are going to go multi-purpose, if you think that the production run on this thing will be like the 688 production run, then you want something with a lot of room to grow.

The 688 was a tight design to start with. I read some of the design material some time ago, and the impression you get is that it was tight when they invented it, and it is tighter now. There is a big powerplant packed in there. If you look at a profile of that sub, two-thirds of it is powerplant, or half of it, and that was a tremendous feat of engineering. When you have a tremendous feat of engineering in 1967, you probably can do better in 1984 or 1988. That is what it amounts to.

DIESEL VERSUS NUCLEAR POWER

Senator **Cohen**. My final question—you didn't expand on the question of diesel versus nuclear power.

Dr. **Friedman**. First, there is a difference in the way they behave. Diesel subs running on batteries are very quiet. Some will say that a properly silenced nuclear sub is as quiet or better, but the point is that you have to make the extra effort.

The other side of that is that on batteries, the diesel sub is not very mobile. Typically, when you hear about a diesel sub that goes about 20 knots, what you are hearing is 20 knots for 1 hour.

In World War II, for example, Admiral Donitz, who ran the German submarine force, said that he regarded the submarines essentially as intelligent mines. His job was to position them in places where convoys were about to show up, and then let them do their job. As soon as the diesel sub is forced to go at high speed for extended periods, it is forced to expose itself, to more or less snorkel which exchanges gas with the atmosphere.

The impression I get from commanders of diesel subs, ex-commanders, is that you spend a lot of your time looking over your shoulder, and you spend a lot of your time worrying about when the airplanes show up and when they attack you.

The fellow I am thinking of was very competent, and he said that he believed he could run a combat patrol in the North Atlantic and bring his crew back alive. He just didn't believe that he could accomplish very much because in order to bring his crew back alive, he would constantly be expecting—every time he snorkeled, he would expect an air attack.

The nuclear sub, which you are buying for all that incredible amount of money, is a sub that is very quiet when it is moving at substantial speed. It means, for example, if you want that submarine to go and attack some Soviet sub that you know is there, and you are here, he can do that without you worrying about him making so much noise that everyone in the ocean knows it.

He can run very covertly for long distances, and that is a very valuable thing, incidentally, in nonnuclear wars. If you will remember, the British sent these nuclear subs down to the Falklands. They sent them down while they were still talking back and forth.

You send down a battle group while everybody is still talking back and forth, it looks like you have got to be kidding. If you send the subs down, no one even knows they are there. If the talks break down, you say: "OK, you want a war, we will give you a war." That gave them the chance to be able to have a diplomacy run, without having to worry about not being there if it broke down. I watched it very closely while it was running, and there was a 50-50 chance that diplomacy would work out. The last thing they wanted was to upset that applecart.

How many places are there in the world where we end up with touchy situations, and we bring in a carrrier battle group? The next thing you know it is on the news, and everyone says: "Boy, frightening some small, miserable country again." But you know that if you don't have something there, a week or two later, it will be too late for us.

Diesel subs are very good if they are running close to shore. They are very good in coastal waters where it is hard to detect them. They are very good if you are waiting in some strait where the other fellow's surface ships just have to go through. The trouble is that this is not what we do.

The only disadvantage we have, in my mind, in not having any diesel subs is that we spend so much time explaining how lousy they are that we don't spend enough time thinking about how to destroy them. I hope that that is not true, and that it is a gross overcharacterization on my part.

I have to say that you cure that one by telling the Navy to get its act together, not by buying a different kind of sub. You cure it by having more inter-NATO exercises. They have diesel subs. Their diesel subs perform well if they are competently run.

If you had a lot of money, and you wanted to have specialized squadrons that operated in shallow water, there might be some point to it. The trouble is that the high-quality ships are so expensive that I can't imagine our ever having them. That is what it comes down to.

They certainly have their values, but I think that their values are greater for other navies than ours. That means that when you see the British or the French buy them, they have a different navy, different animals, and that is what makes it an interesting thing to study.

Senator COHEN. Thank you very much, Dr. Friedman.

Dr. **Friedman**. Thank you, sir.

Senator **Cohen**. Mr. Polmar?

STATEMENT OF NORMAN POLMAR, AUTHOR; ANALYST

Mr. **Polmar**. Thank you very much, Mr. Chairman.

I would like to paraphrase parts of my statement, but actually quote a few words which I think should be emphasized.

I am very concerned about the submarine situation in the U.S. Navy today. I am very concerned because of what I see the Soviets doing and what I see the United States doing.

SOVIET SUBMARINES

Today, the Soviets have a quantitative advantage over the United States of three to one in submarines. I have seen no indication, at any of the levels of classification that I have access to, that that ratio will change in the near future. The Soviets have a very robust shipbuilding industry, and they are concentrating on submarines.

I think we could live with the three-to-one ratio if this were 5, 10, or 15 years ago. I think that we have a problem now because of the qualitative improvements in the Soviet submarine fleet. To quote the Chief of Naval Operations, Admiral Watkins: "When my first command, U.S.S. *Snook,* was launched, we were infinitely ahead of the Soviets in nuclear submarine technology. Later, about 10 years ago, we were 10 years ahead of them. Today, we are only about 5 to 8 years ahead of them, and they are still in relentless pursuit."

Said another way, sir, the Soviets are closing the qualitative gap and they are doing it rapidly. During the past decade, the Soviets have introduced about 12 new submarine designs, some for series production and some were one or two of a kind for special purposes.

One of the charts accompanying my prepared statement lists those classes we have put to sea and those they have put to sea in the last 10 years. The Soviets, gentlemen, cannot produce this many different designs without having a tremendous learning curve.

I regret that there are no intelligence officers or analysts here today to tell you, not what the agreed view is on what those new designs can imply for future characteristics of the Soviet submarine fleet, but the entire spectrum of opinion as to what the Soviets could have in 5 years, 10 years, 15 years, based on this very broad development program they have underway.

The situation gets worse for us. A senior U.S. naval intelligence officer, discussing the Soviet submarine fleet that we will see in the next decade, has written, and I quote: "The impact of the quality upgrading of the Soviet submarine jeopardizes the tactical margin we rely upon today."

He also noted that in 10 years, and I again quote:

> With a newer force, quiet submarines, experienced crews, and improved sensors, the challenge imposed by the Soviet nuclear submarine force of the 1990s will be much tougher to counter than it is today.

I would note that he emphasized the words "much tougher."

The attack submarine issues that we face, I believe are two. One, how many to build; and, two, what types to build. In my opinion, the answer to the first question is very simple: Build lots of submarines. Right now, the Navy proposes four SSN's per year, I would say that that is the minimum that we should build.

The Navy has a goal of 100 SSN's. Even though we never reached our 90 goal that we had for about 14 years, I say that it would be criminal if we do not reach the 100 SSN goal, and I would go, based on my own analysis, beyond that number. Indeed, beyond the traditional missions for submarines, the availability of over-the-horizon targeting, Tomahawk missiles, Harpoons, the possibility of RPV—remotely piloted reconnaissance vehicles—launched from a submerged submarine, and some other things that are being worked on opens a broad spectrum of missions to submarines that were unheard of 10 years ago.

Again, I support unquestionably 100 submarines. I support four a year as a building rate, and I personally would support a higher building rate if we could afford it.

The question of what type of submarine, however, I believe is much more controversial and demands much more of our attention.

NEW ATTACK SUBMARINE

First, why is a new attack submarine being proposed at this time?

Less than 3 years ago, the Navy said that we had no requirement for a new SSN. On July 30, 1981, before a subcommittee of the Senate Armed Services Committee, the commander of the Naval Sea Systems Command said, and I quote:

> We reviewed just back in early 1981, all of the design efforts we had going on at Electric Boat, and decided to stop the design efforts on all new classes of submarines and to proceed on a course of upgrading the 688 class as the [future] attack submarine.

I continue to quote:

> No conspicuously cost-effective candidate to follow the SSN-688 emerged from the studies of the attack submarine. CNO [that was Admiral Hayward] directed that efforts toward the design of a fleet attack submarine, a smaller, less capable submarine, and the SSNX, a larger, more capable submarine, should be discontinued.

Gentlemen, I ask what happened between the summer of 1981 and the summer of 1982 to cause a major change in our attack submarine policy. Was it something that the Soviets were doing; something that we found out in that period; or some technological advance that was suddenly available to us; or was it strictly a political decision? Again, why a new attack submarine design now?

Second, who designed this submarine?

Senator **Cohen**. Are you satisfied with the characteristics of the 688, and the improved 688 as it is now?

Mr. **Polmar**. I am for right now, yes, sir. When we look at the spectrum of what the Soviets could have, and probably will have in 5 or 10 years, we do need something better or different than the 688. My question is, have we thought this out.

Who designed this new submarine? Who developed the basic requirements? Who examined the potential trade offs? Who surveyed the available techology?

If the Navy announced that they were going to build a new fighter airplane, tomorrow we would have knocking at the door briefing teams from Lockhead, McDonnell Douglas, and Grumman. If we wanted a new radar, we would have competitive briefing teams in tomorrow from GE, RCA, ITT, Westinghouse, and Sperry.

This approach has resulted in our having the best military aircraft in the world today, and the best radars in the world today, and in a number of other areas as well. But we don't see that happening with new-design submarines. There has been no effort to design a submarine conceptual capability in industry as we have with these other systems. There are no submarine "skunk works" examining radical ideas of the kind that have given us the world leadership in so many other military areas.

Are we taking the necessary actions to assure that we will retain our qualitative lead over the Soviets?

I submit that the manner in which we have been designing submarines in the past has permitted the Soviets to close the gap; as Admiral Watkins has pointed out, from being infinitely ahead some two decades ago, they are catching up with us.

Look at the submarines we have designed. We paid a large amount in displacement and dollars to go from the 637, the *Sturgeon,* to the 688. It got us a few more knots of speed and significant silencing. But look at the cost beyond dollars.

Numerically, the 688 is the largest submarine class we have ever built in a post-war period. The 688's cannot carry mines. They cannot operate under the ice. If we look at the weapons carried per ton of ship, we see that the 688 is one of the least efficient submarine designs. The belated decision to put 12 vertical launch tubes is rectifying this. There are other areas that I cannot go into in this open session. I am not saying that the 688 is a bad submarine, rather I believe that we could have done better, much better, and I want us to do better in the future.

In my prepared remarks, and I won't go through them completely, I quote a number of authorities, who have said this: submarine commanders; one of the first commanding officers of the 688; the first commanding officer of our second nuclear submarine, the *Seawolf;* young officers; senior officers; engineers; civilian and military people, including Dave Mann, Mr. Paisley's predecessor; they do not see that we are examining the full range of options available to us.

I stress to you that this is a broad spectrum of people, some of whom have never seen a submarine—of course, neither did John P. Holland from whom the Navy bought its first submarine, an Irish immigrant schoolteacher, and who designed our first submarine; some of these people are laymen, some of these people are experienced submarine commanders, some of these people are engineers and submarine designers.

What are the industry views, and those of our national laboratories?

I have personally visited the Electric Boat Yard, General Electric firm, and the Los Alamos National Laboratory. There is some highly innovative thinking at those facilities about future submarine concepts and designs, but those ideas are not being sought here in Washington. Such outside expert opinion and views, which would be again part and parcel of a new naval aircraft, missile, or radar, are missing from our submarine-development efforts.

I would finally stress in this regard that my list includes people such as George Sawyer, who was our first Assistant Secretary for Shipbuilding under Mr. Lehman. Last year he told an audience that a specialized attack submarine should be considered, expecially a guided-missile submarine.

There is a myth in the Navy's leadership that every SSN must be all purpose. This myth is, forgive me for my flippancy, a "red herring." Obviously, the 637 class can operate under ice, 688's normally do not. The 688's cannot lay mines, and other submarines do. Only the 688's have the speed to work with the carrier groups. The *Lipscomb* is too slow for many submarine missions. The *Skipjacks* lack the sonar and silencing for effective ASW missions. Only the 688's can effectively carry Tomahawk strike missiles because they have the 12 vertical tubes.

To summarize the submarine situation: yes, we do need 100 SSN's or more. Yes, we should build four per year. Yes, we already have specialized submarines, if you would care to examine what we do with them. Yes, we should work harder on the next design. We must objectively examine all reasonable alternatives. We cannot continue in the course that we have been sailing. If so, we lose not only in numbers to the Soviets, but eventually—maybe not this year, and maybe not in five, but eventually we lose in quality as well.

DIESEL SUBMARINES

Let me conclude with the fact that a couple of staffers on this side of Capitol Hill, and a couple on the other side of the Hill, have asked me to say a few words about deisel submarines.

It is difficult for me to add anything to the articles, studies, and statements that have been made in this area. The facts are all on the table. Emotions have ruled. There is nothing more to be added about the need for the U.S. Navy to have diesel subs.

In this regard, 2 weeks ago, a U.S.-flag officer told me: "When I consider the real and balanced reason for not building diesel subs, it is just going to be a question that the Navy does not want to give up a nuclear for a diesel on a one for one basis." I certainly agree with that. It would be a mistake to do so. However, if we talk about three for one, which is about the cost ratio, that is another matter.

Let me raise a different diesel-submarine issue, which I think is very timely. Because of the Navy's attitude, we have prevented foreign countries from building diesel submarines for themselves in American shipyards. We allow our allies to buy aircraft, missiles, radars, torpedoes, and even surface ships—custom-built for them—in this country. Why not diesel submarines?

Today, there are three countries—Australia, Israel, and South Korea—that wish to buy diesel submarines here in the United States. To do so would improve our naval shipbuilding base, help our relations with those countries, provide them with improved military capability, and the U.S. style of training and other things, which would make it easier to work with them. It would bring other Allies after that to American industry, rather than forcing them to foreign shipyards. It would provide imployment to several thousand American workers.

In my opinion, we must allow our Allies to build submarines in this country, as long as it does not interfere with our nuclear submarine building base.

To conclude, in my opinion, submarines are more important in naval warfare today than ever before. They are taking on increasing importance even within our Navy. Let me once again quote the U.S. naval intelligence officer whom I cited earlier, and I have copies of his article that I passed out to the staff.

He quoted the great baseball player, Satchel Paige, as saying: "Don't look back, someone might be gaining on you." This captain wrote: "U.S. Navy submarine force today is the finest in the world and could remain that way, but the naval officer or political leader who does not hear the footsteps closing from behind simply is not listening."

Gentlemen, the footsteps are closing on us. I implore you, as an analyst, as a consultant to the Government, as a would-be historian, as an American, to listen to those other voices that I cite here. This can only be done by a two-track attack-submarine-development program, by having an objective study team of the SSN issue, and a number of other ways.

We cannot afford to continue to develop attack submarines in the future as we have in the past. The submarine is too important to the U.S. naval strategy and to the national defense.

Thank you very much.

[The prepared statement of Mr. Polmar follows:]

PREPARED STATEMENT OF NORMAN POLMAR

Mr. Chairman, Gentlemen:

I appreciate the opportunity of being with you today.

Three weeks ago I was at sea in the Aegis missile cruiser YORKTOWN. The ship was most impressive. Our Aegis cruisers are probably the most potent anti-air warfare ships afloat today... Aegis is significantly more capable than the new series of Soviet anti-air systems.

Several U.S. weapons appear to be significantly superior to their Soviet counterparts--the F-16A and F-15 fighter aircraft; A-6 Intruder all-weather attack aircraft; SH-60B LAMPS III helicopter; and the Phoenix, Sidewinder, and Sparrow missiles.

However, I am less comfortable about comparisons of U.S. and Soviet attack submarines. Today the Soviets have a quantitative advantage over the United States of 3-to-1 in submarines. Possibly more important, the qualitative leadership in submarines that we have long enjoyed and touted is diminishing.

To quote the Chief of Naval Operations, Admiral Watkins, "When my first command, USS SNOOK, was launched [1960], we were infinitely ahead of the Soviets in nuclear submarine technology. Later, about ten years ago, we were about ten years ahead of them. Today we are only about five-to-eight years ahead of them and they are still in relentless pursuit."

Said another way, the Soviets are closing the qualitative gap--and very rapidly. During the the past decade the Soviets have introduced about 12 new submarine designs--some for series production, some one- or two-of-a-kind for research or special purposes.

They cannot produce this many different designs without having a tremendous learning curve. The situation will get worse--for us. A senior U.S. naval intelligence officer, discussing the Soviet submarine fleet we will see in a decade, has written, and I quote, "the impact of [the] quality upgrading of the Soviet submarine jeopardizes the tactical margin we rely upon today." He also noted that in ten years, and I again quote, "with a newer force, quiet submarines, experienced crews, and improved sensors, the challenge posed by the Soviet nuclear submarine force of the 1990s will be much tougher to counter than it is today." I would note that he emphasized the much tougher.

The attack submarine issues for the United States are (1) how many to build and (2) what types of attack submarines to build.

* * *

In my opinion, the answer to the first question is simple: Build lots of attack submarines. Beyond the ASW mission, the development of Harpoon and Tomahawk missiles coupled with over-the-horizon targeting--the Outlaw Shark concept--and the promise of torpedo-tube launched reconnaissance vehicles (RPVs) could permit submarines to carry out many missions that previously could be done only with surface warships or airplanes.

The U.S. Navy currently has a goal of 100 SSNs. That goal certainly seems justified when we consider the Soviet as well as Third World naval threats as well as U.S. intelligence collection requirements. To reach this 100-submarine goal a building rate of four SSNs per year should certainly be supported by Congress. However, I have major questions about the direction we are taking with respect to what type of submarines we should build.

Allow me to raise the following questions.

First, why is a new design attack submarine being proposed at this time? Less than three years ago the Navy said we had no requirement for a new SSN. On July 30, 1981, the Commander of the Naval Sea Systems Command--the agency that designs and builds our submarines--said that the Navy was not designing a new submarine. To quote Admiral Fowler, "We reviewed this back in early 1981, all the design efforts that we had going on in Electric Boat, and decided to stop the design efforts on all new classes of submarines and to proceed on a course of upgrading the 688 class as the [future] attack submarine."

I continue to quote, "No conspicuously cost effective candidate to follow the SSN-688 class emerged from the studies of attack submarines. The CNO [that was Admiral Hayward] directed that efforts toward the design of the fleet attack submarine, a smaller, less capable submarine, and the SSNX, a larger, more capable submarine, should be discontinued."

Gentlemen. I ask what happened between the summer of 1981 and the summer of 1982 to cause a major change in our attack submarine policy? Was it something we saw the Soviets doing? Some technological advance that was available to us? Was it strictly a political decision?

Again, why is a new attack submarine design being put forward with such high priority?

Second, who designed this submarine? And here I don't mean the detailed design, but who developed the basic requirements? Who examined the potential tradeoffs? Who surveyed the available technology?

If the Navy announced that it were seeking a new airplane we would have Lockheed, McDonnell Douglas, and Grumman knocking at the Pentagon doors with new ideas and concepts. If we wanted a new radar we would have competitive briefing teams from GE, RCA, ITT, Westinghouse, and Sperry in Washington tomorrow with ideas for the radar. This approach has resulted in our aircraft and our radars being the best in the world today.

But we do not see this approach with the new design submarine. There has been no effort to develop a submarine conceptual capability in industry. There are no submarine "skunk works" examining radical ideas, of the kind that have given us world leadership in aviation and in radar.

Are we taking the necessary actions to insure that we will retain our qualitative lead over the Soviets? I submit that the manner in which we have been designing submarines in the past has permitted the Soviets to close the gap. As Admiral Watkins has pointed out, from our being "infinitely" ahead in submarine development some two decades ago we are just a few years ahead. And, they are catching up with us.

Let us look at the submarines we have designed. We paid a large amount in displacement and dollars to go from the SSN-637 to the SSN-688 class submarine. That got us a few more knots of speed and significant silencing. But look at the cost--beyond dollars and size--of the SSN-688 class. Nuumerically and in size this is the largest attack submarine in our Navy; the 688s cannot carry mines and cannot operate under the ice. If we look at weapons carried per ton of ship we see that the SSN-688 is one of the least efficient submarines ever designed. (The belated decision to provide 12 vertical-launch tubes in the SSN-688 for Tomahawk missiles helps to change this to a favorable ratio of weapons-to-tonnage.)

I am not saying that the SSN-688 is a bad submarine. Rather, I believe that we could have done better... much better. And, I want to see us do better in the future.

For example, Captain Richard B. Laning, whom Rickover chose to be the first commander of our second nuclear submarine, the SEAWOLF, has pointed out the great resistence of our submarine force to automation. Lieutenant Commander Ralph Chatham, a submariner who has just left the Defense Science Board, has warned of our declining acoustic advantage. Dr. Richard Pariseau, a nuclear submariner who served as director of Advanced Submarine Technology in the Office of Naval Research, has criticized our emphasis in submarine silencing at the cost of other considerations that, in wartime, could have more impact than noise levels. Mr. Ben Friedman, formerly of the Office of Naval Research, has long argued for advanced propulsors for our submarines. Captain William Bohannan, a former captain of the first SSN-688 class submarine, has called for innovation in submarine automation, design, and construction techniques. Dr. David Mann, a long-time civilian in the Navy Department and the former Assistant Secretary of the Navy for research has called for a smaller SSN--going back to the SSN-637 speed but costing only about three-quarters of the SSN-688 cost.

And what of the views of industry and our national laboratories? I have personally visited the Electric Boat and General Electric firms, and the Los Alamos laboratory; there is some highly innovative thinking at those and other facilities about future submarine concepts and designs. But those ideas are not being sought here in Washington.

Such outside, expert opinions and views--which would be part and parcel of the Navy's approach to a new aircraft, missile, or radar--are missing from the submarine development effort.

The pleading for the consideration of broader approaches to SSN development has even been heard within the Navy. Officers in several of the submarines I have visited--admittedly relatively junior compared to the gentlemen here today--have expressed strong views on the subject of building specialized attack submarines. So has George Sawyer, who was the first Assistant Secretary for shipbuilding under Mr. Lehman, who last year told an audience that "specialized attack submarines should be considered... especially guided missile submarines."

There is a myth in the Navy's leadership that every SSN must be all purpose. This is a myth--a red herring. Obviously, the STURGEON (SSN-637) class can operate under the ice; the SSN-688s do not. The 688s cannot lay mines; other submarines can. Only the 688s have the speed to work with carrier battle groups. The LIPSCOMB is too slow for many submarine missions. The SKIPJACKs lack the sonar and silencing for effective ASW operations. Only the later 688s can effectively carry out Tomahawk missile strikes because of their 12 vertical Tomahawk tubes. The list continues.

To summarize the SSN situation, yes... we should build to 100 and we should build beyond that number. But the next generation attack submarine must be the best that we can design and build. And, there appears to be justification for building more than one type of attack submarine--in the same manner that we build more than one kind of aircraft and we build more than one kind of surface combatant.

We must objectively examine all reasonable alternatives. We cannot continue on the course we have been sailing. If so, we will loose not only in numbers to the Soviets, but eventually in quality as well.

I was also asked to say a few words about diesel submarines. It is difficult for me to add anything to the numerous articles, statements, and studies in this area. The facts are on the table. Unfortunately, emotions have ruled. Examples include an admiral calling the representatives of one shipyard a "snake oil salesman" for proposing diesel submarines and a government official claiming that putting American sailors in diesel submarines is like "condemning them to death." I would not pass that comment on to the sailors now manning our four remaining diesel combat submarines.

Only two weeks ago a flag officer told me what I consider to be the real and a valid reason for not building diesel submarines. Congress would probably wish to replace nukes with diesels on a 1-for-1 basis. That, gentlemen, would be a mistake. No one that I know of would condone that action. Three-for-one... well that's another matter.

But I raise the issue of diesel submarines for a more timely and significant reason. The Navy's paranoia on this issue has led to our refusal to permit allied nations to build submarines in this country, in yards that are not working on our nuclear submarines. We allow allies--and neutral nations--to buy aircraft, missiles, radars, torpedoes, and even surface warships from American industry.

Why not diesel submarines? Especially for allies as Israel and South Korea. Our permitting them to build diesel attack submarines in this country would,

(1) improve our naval shipbuilding base

(2) help our relations with those countries

(3) provide them with improved military capability--with U.S. styletraining and subsystems that would make it easier for us to work with them in wartime

(4) bring other allies to our industry rather than forcing them to go to foreign shipyards

(5) to provide employment to several thousand American workers

* * *

In my opinion, submarines are more important in naval warfare than ever before. They are taking on an increasing importance within our Navy. One of the tables I have provided shows how the U.S. Navy's surface warship program is being cut back--but not the submarines. Let me conclude by again quoting the naval intelligence officer I cited earlier--and I have copies of his article available for your staff: He quoted baseball great Satchel Paige as saying: "'Don't look back. Something might be gaining on you.'

"The U.S. Navy submarine force today is the finest in the world and could remain that way. But the naval officer or political leader who does not hear the footsteps closing from behind simply isn't listening." [End quote]

Gentlemen. There are footsteps closing on us. I implore you--as an analyst, as a consultant to the Navy and Defense Department, and as a would-be historian... to listen to these other voices I have cited. This can be done by a two-track attack submarine development program and by having an objective study of the SSN issue.

We cannot afford to continue to develop attack submarines in the future as we have in the past. The submarine is too important to U.S. naval strategy and to national defense.

Thank you.

(References follow)

References:

CAPT Thomas A. Brooks, USN, "Their Submarines," Naval Institute Proceedings, January 1984, pp. 48-50.

LCDR Ralph E. Chatham, USN, "A Quiet Revolution," Naval Institute Proceedings, January 1984, PP. 41-46.

Dr. Norman Friedman, "Is the Nuclear Submarine Really Invulnerable?" Defence [England], February 1982, pp. 8-15.

Dr. Richard Pariseau, "How Silent the Silent Service?" Naval Institute Proceedings, July 1983, pp. 40-44.

Norman Polmar, "Attack Submarines--Pro and Pro," Naval Institute Proceedings, June 1982, pp. 121-122.

___________, "The American Submarine, 1984--2014," Naval Institute Proceedings (Naval Review issue), May 1984, pp. 196-213.

CDR A. Van Saun, USN, "Attack Submarine: The Hidden Persuader," Naval Institute Proceedings, June 1982, pp. 100-103.

Active Submarine Strengths
(early 1984)

		United States	Soviet Union
Nuclear-propelled Submarines			
Modern Ballistic Missile		35	62
SSBN-726	Ohio	(4)	
SSBN-616	Lafayette	(31)	
Older Ballistic Missile			3
Guided/Cruise Missile		*	50+
Torpedo-attack		87	70+ **
SSN-688	Los Angeles	(26)	
SSN	Other Modern Classes	(52)	
SSN	Older Classes	(9)	
Special-purpose/Experimental		3	2
SSN-608	Ethan Allen	(2)	
SSN-575	Seawolf	(1)	
Diesel-electric Submarines			
Older Ballistic Missile			15
Guided/Cruise Missile			18
Torpedo-attack		4	145+
Special-purpose/Experimental		1	10+
	TOTAL NUCLEAR	125	187+
	TOTAL DIESEL	5	188+
	TOTAL SUBMARINES	130	375+

* U.S. torpedo-attack submarines are being fitted to fire the Harpoon and Tomahawk cruise missiles.

** Includes 10 former Yankee-class SSBNs, some of which are being modified to SSN/SSGN configurations.

New Submarine Designs
(Completed 1974-1984)

	United States	Soviet Union
New Designs	SSBN OHIO (Trident) SSN LOS ANGELES SSN LIPSCOMB	SSBN TYPHOON SSGN MIKE SSGN OSCAR SSN SIERRA SSNX UNIFORM SSNX (small design) SS KILO AGSS LIMA (research) AGSS INDIA (rescue)
Improved Designs		SSBN DELTA III SSN VICTOR III SSN ALFA*
Conversions-Modifications	SSBN LAFAYETTE (Trident conversion)	SSGN YANKEE SSNX YANKEE SSQ GOLF

* First ALFA SSN went to sea about 1969; the follow-on, production design had an IOC of about 1978.

Current Submarine Design Emphasis

United States

- ON-BOARD SENSORS (sonar)
- RADIATED NOISE REDUCTION
- TORPEDO (Mk 48/ADCAP)
- FIREPOWER (recent emphasis)
- RELIABILITY
- PERSONNEL
  - Training
  - Experience
- HABITABILITY

Soviet Union

- OFF-BOARD SENSORS
- RADIATED NOISE REDUCTION (recent emphasis)
- WEAPONS PAYLOAD (torpedo + cruise missile payload)
- MINELAYING
- DECOYS, COUNTERMEASURES
- SPEED
- DEPTH
- DOUBLE HULL, COMPARTMENTATION
- NUMBER OF SUBMARINES
- BUILDING CAPACITY (5 yards + 10? classes in production)
- DIESEL SUBMARINES

U.S. SURFACE COMBATANT PROGRAMS

	FY 81	82	83	84	85	86	87	88	89
Nuclear Missile Cruisers (CGN-42)									
Jan 80 Carter	--	--	--	--	--				
Jan 81 Carter		--	--	--	--	--			
Jan 82 Reagan			--	--	--	--	1		
Jan 83 Reagan				--	--	--	--	--	
Jan 84 Reagan					--	--	--	--	--
Actual authorized		(none)							
Aegis Missile Cruisers (CG-47)									
Jan 80 Carter	2	3	3	4	4				
Jan 81 Carter		2	2	4	4	4			
Jan 82 Reagan			3	3	3	4	4		
Jan 83 Reagan				3	3	3	3	2	
Jan 84 Reagan					3	3	3	2	2
Actual authorized	(2)	(3)	(3)	(3)					
Guided Missile Destroyers (DDG-51)									
Jan 80 Carter	--	--	--	--	1	--	3		
Jan 81 Carter		--	--	--	--	1	--	3	
Jan 82 Reagan			--	--	1	--	3	5	
Jan 83 Reagan				--	1	--	3	5	
Jan 84 Reagan					1	--	3	5	5
Auctual authorized									
ASW Destroyers (DD-963)									
Jan 80 Carter	--	--	--	--	--				
Jan 81 Carter		--	--	--	--	--			
Jan 82 Reagan			--	--	--	2	1		
Jan 83 Reagan				--	--	--	--	1	
Jan 84 Reagan					--	--	--	--	
Actual authorized		(none)							
ASW Frigates (FFG-7)									
Jan 80 Carter	6	4	2	4	--				
Jan 81 Carter		3	2	--	--	--			
Jan 82 Reagan			2	2	2	3	3		
Jan 83 Reagan				--	--	--	--	--	
Jan 84 Reagan					--	--	--	--	--
Actual authorized	(6)	(3)	(2)	(1)					
Net changes in fiscal 1985-1987 shipbuilding programs					deleted 14 of 27 surface combatants				

U.S. SUBMARINE PROGRAMS

	FY 81	82	83	84	85	86	87	88	89
Trident Submarines (SSBN-726)									
Jan 80 Carter	1	1	1	1	2				
Jan 81 Carter		1	1	1	2	1			
Jan 82 Reagan			2	1	1	1	1		
Jan 83 Reagan				1	1	1	1	1	
Jan 84 Reagan					1	1	1	1	1
Actual authorized	(1)	--	(2)	(1)					
Attack Submarines (SSN-688)									
Jan 80 Carter	1	1	1	2	--				
Jan 81 Carter		1	1	1	1	2			
Jan 82 Reagan			2	3	4	4	4		
Jan 83 Reagan				3	4	4	5	5	
Jan 84 Reagan					4	4	4	4	4
Actual authorized	(2)	(2)	(2)	(3)					
Net changes in fiscal 1985-1987 shipbuilding programs					deleted 1 SSN				

Senator COHEN. Thank you very much, Mr. Polmar.

I must agree with your conclusion that we should not seek to substitute diesels for nuclear-powered submarines. However, I think that it is an excellent suggestion that we build them for Allies and others interested in purchasing them.

NEW SSN SPECIFICATIONS

I would like to know just a little bit more about some of the issues you have raised. Do you know, for example, what the specifications are for the new SSN?

Mr. POLMAR. Yes, sir. The Navy, very kindly, 2 weeks ago gave me complete briefing on the new SSN. I have had some access to different parts of it, specifically the weapon systems. I believe I got the entire briefing about 2 weeks ago.

Senator COHEN. Did you have a prior disposition to questioning the design by virtue of the fact that it was not competed, or that there was not an outside generation of ideas about the kinds of threats we will face in the future; and therefore, this represented a kind of in-house, narrow thing, a simple extension beyond the 688?

Mr. POLMAR. Yes, sir.

Senator COHEN. You did?

Mr. POLMAR. Yes, sir.

Senator COHEN. After the briefing, did that change your mind at all?

Mr. POLMAR. It opened my mind to the fact that we have some very bright people—I always knew that we had bright people in the Pentagon, but the current generation of submarine leadership is a lot broader than they have been in the past. There is no question about it. I would like to expand that a good deal more, sir.

Senator COHEN. Is it a philosophical question you are raising, or a practical one, saying that because of the absence of this outside competitive kind of challenge, that somehow this particular new ship has not had the kind of scrutiny and analysis that it should have had?

I am not sure I understand what this outside generation of ideas will do to improve this particular ship design.

Mr. POLMAR. It is very difficult to come up with the words we need to describe this, both politely and realistically, but let me say, 20 hours ago, I was standing on top of the machinery for a U.S. nuclear-attack submarine. Standing on top of the turbine for this submarine, I was left with the feeling, after listening to several experts in this area for several hours, that we can do a lot better. It is technical.

Senator COHEN. You mentioned that you have been going around to some of the experts outside of the Pentagon.

Mr. POLMAR. Yes, sir, and some inside.

Senator COHEN. As a result of those conversations, are you satified that there exists a design that is a quantum leap beyond what we are talking about with the new design SSN? Is there something there that we are missing? Is the Navy in fact deficient in the kind of capabilities they are going to build into this new submarine?

I guess what I am asking is, Is it an abstract question you are asking when saying: "can we do better?", without any solid evidence that there could be improvements?

Mr. **Polmar**. In several specific areas, I personally am convinced that we can do better.

You used the term "a new design," and there is no outside agency of the U.S. Navy that designs submarines as there is, as I said, in many other areas of military and naval endeavor. There is no outside agency, so there is no single design.

However, I would say, for several of the key components of a modern nuclear submarine, I have become convinced, and several of the naval officers that I have spoken are convinced, that we can do better within the very near future.

CAPABILITIES OF THE IMPROVED SSN-688

Senator **Cohen**. You indicated before that the 688 does not have underice capability or mining capability. Does the improved 688 have that?

Mr. **Polmar**. The improved 688 will, yes, sir. Also, as I said, the weapons payload of the original 688 compared to the one with 12 vertical-launch tubes.

Senator **Cohen**. Do you have some specific recommendations that you are prepared to make to the Navy about improving the new design?

Mr. **Polmar**. Only with some of the facilities and activities that I visited. I, myself, do not have either the technical knowledge nor the staff to make specific technical recommendations on the basis of change this or move that.

Senator **Cohen**. What you are saying is that, based on conversations you have had with experts in the field, you believe that as a result of consultations with those experts outside of the Pentagon, that improvements could be made?

Mr. **Polmar**. Yes, sir, and also with some experts within the Pentagon.

Senator **Cohen**. Have you committed those ideas to writing, or have you made those specific recommendations in conversations with anyone within the Pentagon?

Mr. **Polmar**. Yes, I have, with a couple of civilians within the Pentagon, not with the Navy community.

Senator **Cohen**. I think that Admiral Thunman is going to address himself to the question that you properly raise—What happened between 1981 and 1982 to reverse Admiral Hayward's statement? Who decided it, and why? I suspect that he will address himself to those issues in the open session, and then reserve the technical discussion for the closed session.

Senator Nunn?

Senator **Nunn**. Thank you, Mr. Chairman.

DIESEL NUCLEAR RATIO TRADEOFF

You mentioned a minute ago, Mr. Polmar, the three for one and the one for one tradeoff between the diesel-electric and the U.S. nuclear submarines. You indicated clearly that you would not advocate one for one. You said that a three-for-one diesel/nuclear ratio tradeoff is another matter. Does that mean that you would go for a three-for-one tradeoff?

Mr. **Polmar**. Yes, sir, I think I would for two or three reasons. One, exactly what Dr. Friedman said, we spend most of our life now concentrating on how to hunt, deal with, operate against nuclear submarines. Although our allies have some submarines, most of our allies' submarines are dated and are not of the quality we see in some of the newer diesel submarines.

I think we need a small number of diesel submarines to train our own forces and to do some other missions, such as if we were engaged in an operation off of Central America, because someone was shooting, and we wanted to stick up an antenna at night and listen. Why send a 688 with 125 or 130 people on board, if we could send a diesel boat with 40 or 50 people on board, where it is essential a stationary listening platform.

Primarily for training and experience. The next country that fires a shot at an American ship, or aircraft, or American serviceman, the odds are overwhelming that it will not be the Soviet Union, it will be the Third World. If it is Cuba, Libya, Vietnam, North Korea, and in the future other countries, they will have diesel submarines. Yes, I personally at this stage would be willing to trade one nuclear submarine for three diesel submarines.

Senator **Nunn**. If you were writing the 1985 budget, and there was a given amount of money, let's say, for four nuclear submarines, what you would do is to reduce that by one, but add in three diesels?

Mr. **Polmar**. If I were guaranteed by Congress that I would get three for one, yes, sir.

Senator **Nunn**. What if it were two for one?

Mr. **Polmar**. I think I would have to say, no, because I think you can do three for one.

Senator **Nunn**. You mentioned the reluctance of the Navy to let allies purchase or build diesel submarines here. Why is that?

Mr. **Polmar**. I can't answer that, sir; I don't know. I do know that those three countries have approached us, two of them quite seriously. I have spoken to the commander in chief of the Israeli Navy on this issue. I have spoken to senior officers in both the Korean and Israeli Navies, and they both intend to build diesel submarines. They would prefer to do them in the United States, rather than foreign shipyards.

Senator **Nunn**. Is there any doubt that we have the shipbuilding capacity to do it?

Mr. **Polmar**. We have the shipbuilding capacity.

Senator **Nunn**. The capacity greatly exceeds the demand right now, doesn't it?

Mr. **Polmar**. Yes, sir. We have firms that are ready tomorrow to start working with foreign designs, but building the ships with American materials, with American steel, in the United States, with American workmen, for all three of those countries.

Senator **Nunn**. Do you have any conceivable reason why those have been turned down, or do you have any guess?

Mr. **Polmar**. I would guess that it is just the U.S. Navy's attitude toward diesel submarines.

Senator **Cohen**. Could I offer one? Could it be that they don't want to build up the capability here so that people like you might come in and say, let's have three for one now that we have the technical know-how?

Mr. **Polmar**. I am glad you said that, sir, and not me.

Senator **Nunn**. If that really is the Navy's reason, it really would be a very disturbing fact.

Mr. **Polmar**. I don't know the Navy's reason.

Senator **Nunn**. It would be a very serious blow to our own shipbuilding people for what I would consider to be a very parochial reason. We can ask the Navy about that.

REDUCING SUBMARINE PROGRAMS

One other question, Mr. Polmar. We are going to have to come down. The Navy has been given, as I understand, a certain amount of reductions to make. If you were making reductions, would you reduce any of the submarine program, would that be your top priority?

Mr. **Polmar**. I would not reduce the current plan to build four 688's this year and next. I would absolutely not touch that.

Senator **Nunn**. Would you say that that would be your top priority in shipbuilding?

Mr. **Polmar**. My top priority would be the CG-47 class, the Aegis cruisers. My second priority, looking at the list of ships, would be the 688's. I hate putting the two of those in one and two. I would say, looking at the list of ships we are planning, and the ships that we are developing, the only two programs I would not touch under any condition right now would be the CG-47 with Aegis, and the 688. The rest I would be happy to play around with.

Senator **Nunn**. What about the DDG-51, where do you rank that one?

Mr. **Polmar**. Right now, I would rank that on the low side of my medium point. I am not particularly happy with that design, sir.

Senator **Nunn**. Would you be willing to trade the DDG-51? Let's us say that the choice was eliminating the DDG-51 in this year's budget, or eliminating one of the submarines, which one would you eliminate?

Mr. **Polmar**. I have absolutely no hesitation, given that choice, in eliminating the DDG-51.

Senator **Nunn**. What would you think if the Navy came forward with the opposite?

Mr. **Polmar**. That is not the way I would do it for a number of reasons. At this stage, as long as the CG-47 line is not touched, I would say that that is the wrong way to go.

Senator **Nunn**. Would you care to elaborate as to why, or does that really incorporate all of your testimony?

Maybe you could say a few words about the DDG-51.

DDG-51

Mr. **Polmar**. I think the surface combatant program is important. The DDG-51 began in the late 1970's with the DDX study. One of the senior admirals in the U.S. Navy told me to go and sit in on all of those meetings. They tried to start with a 6,000-ton ship, then it went to 7,000, now it is 8,000 something, as I recall. The size has gone up for a number of reasons. The cost has gone up considerably.

When we compare that with the CG–47, with the vertical-launch system, we see that the new destroyer is lacking two key elements. One-quarter of the missile capacity is gone. We go from 122 in the CG–47, and I believe that the number is 90 or 93 in the DDG–51. We cannot afford, considering the limited number that we have, to go for a ship that has that big a reduction in fire power.

Second, the absence of the full helicopter facility—we have lots of ships with helicopter facilities. We are talking about a destroyer that is going to be around until 2040 or longer, depending on how long we build them. I don't think that we can afford to put to sea a major surface combatant without the maximum number of weapons we can fit into a ship of that size, and a full helicopter or aviation capability.

In 10 years, it may be VSTOL, it may be RPV's, it may be just LAMPS–III. But I don't think that we can afford, especially for a ship that is going to trail a towed sonar array—we just don't have the ship-launched weapons to go after submarines and to do other things over the horizon, targeting, and some other things.

If you would write into law that these ships can never be more than 50 miles from a carrier, and that is in the law, that is fine. But if that is not in the law, and these ships will be used as surface combatants, have been used for the last 15 years, we must have the maximum number of missiles on that ship, especially since it is primarily an AAW ship.

Senator NUNN. Thank you.

AEGIS

Senator COHEN. You seem very supportive of Aegis and, as you have been reading, the Aegis is coming under criticism by some. I am asking Senator Hart's question now. Would you favor substantial additional operational testing of the Aegis weapon system?

Mr. POLMAR. If we can afford the missiles, there is no question, let's test it for two reasons. One, the more you test, you not only find out what the system can do, but we are limited in another way—forgive me, but I think this is true of the submarine area as well as the Aegis area. Because we are limited in the number of shots we take, when we build a system and when we exercise it, we don't spend the amount of time developing tactics and doctrine that I think we could. So for both of those reasons, to really work out any bugs that may be in the Ageis system, and, second, to help us develop better tactics and doctrine. There is no question, I totally agree with Mr. Hart, I want a much more extensive test program.

Senator COHEN. What about your support for the ship itself?

Mr. POLMAR. Total support, absolutely. What we did was to take an existing hull of a 963, the same powerplant, the same maintenance, the same manning below deck, and we added to it the Aegis system, a beautiful piece of work by the Navy of improving an existing hull, an existing ship design. It is very comparable to what we are doing now with the 688—vertical tubes, the under-ice capability, the mine-laying capability.

Admiral Gorshkov, the head of the Soviet Navy, is reported to have a plaque in his office that says: "Better is the enemy of good enough." If something is good enough, and you continue to improve it, unless you can make a significant increase in capability, you don't go for a new ship. In this case, I think that the GC-47 was beautifully designed because we put a new radar and a new missile system with a vertical launch into an existing hull, it is easily supported by the Navy because we have 35 ships of that basic hull.

Senator COHEN. Would you slow the production in order to accommodate more testing?

Mr. POLMAR. Absolutely not. As a matter of fact, if anything, I feel that we should build more of those ships, especially if we delay the DDG-51, we should build more of the CG-47.

Senator NUNN. I was just glad that he didn't say that Admiral Gorshkov's plaque read: "Better is better."

Mr. POLMAR. Despite our political differences, your absent colleague, I think, has come up with some very good ideas, and I would agree with all of his military proposals and ideas. I think that they have made people think, and to me that is very important. We have to think.

Considering the Third World and the Soviets, this country has problems in the military area, and anyone who makes our people think, work harder to get the solutions, think, should be commended. Even though I do not agree with a number of Mr. Hart's specific programs.

Senator COHEN. We will just tell him about the first portion. Thank you.

Mr. POLMAR. Thank you very much.

Senator COHEN. Admiral Thunman?

ASW ASSESSMENTS

Mr. CANN. Mr. Chairman, I have to make one comment before we continue, and that is I think it would be useful, based on some of the discussion we have just heard, to point out we have a number of analyses that have been done and are being done on a continuous basis.

More importantly, we have a classified analysis on the entire ASW assessment as to our view on improvements, on Soviet threat vis-a-vis our response to it; basically, where we stand with respect to our current platforms, and where we should be proceeding in the future.

With your permission, we will send it over to be included in the classified record of this hearing.

Senator COHEN. Fine, it will be included.

[Retained in committee files.]

Senator NUNN. May I ask one question of Mr. Cann before I go?

BUILDING DIESEL SUBMARINES

The criticism of not letting our allies buy diesel ships, do you have any response to that?

Mr. CANN. I heard the question before, and unfortunately I am just not personally in a position to answer that question, but we will certainly get you an answer to it.

Senator NUNN. Could you get it for the record?

Mr. CANN. Yes, sir. Admiral Baciocco has a response.

Admiral BACIOCCO. I was not involved in the discussions, but I have seen some correspondence related to the question of the Israelis. It is my understanding that they wanted us to design a submarine, as well as build it.

It is also my understanding that the assessment of our capability to do that, in fact, did indicate it would have a negative effect upon our own submarine design and shipbuilding capability.

As such, I understand that it was stated that it was not desirable under those circumstances. I think it was in agreement with Mr. Polmar's comments that he would support it, but he didn't want it to impact negatively on our ability to support our own national defense in the submarine building and design area.

Senator NUNN. But there is so much excess capacity, as everyone tells me, that I have a hard time believing that. If you would submit a response for the record, I would appreciate that.

Senator COHEN. You could separate it into two parts. You stated that it would have a negative impact upon our own shipbuilding capability, and that it would put too much of a burden on our design people.

Admiral BACIOCCO. That was my understanding, but we can provide, probably in the classified portion of the record, some more information on that question.

Senator COHEN. I hope you will, because I find it almost incredible to say that we don't have enough people in the design field who could make a diesel submarine, when I assume that there are enough plans circulating around the world, that we know what the deficiencies are, and we would know what would have to be done to make them suitable for a nation like Israel, or Korea, or Australia, or Great Britain, to the extent that they wanted to buy some diesel submarines or smaller submarines. I would like to see the evidence that it would put too much of a burden on our design people.

[The information follows:]

DIESEL SUBMARINE CONSTRUCTION

This response needs to be presented in the context of the two requests that the Navy has received regarding the design and/or construction of diesel submarines in this country. First, the Israeli Navy desired to have their new generation diesel submarine designed and constructed in a U.S. shipyard. Second, the South Korean Navy desired that we conduct a technical review of their design for a new submarine. The prime issue therefore deals with the capacity of the U.S. submarine design and construction industry, including the Naval Sea Systems Command, to absorb these additional efforts without impact to our own submarine design and construction program.

Before responding to the question of the availability of capacity in U.S. shipyards to build submarines for allied or friendly nations, some definition of terms is needed. The capacity and the capability of a shipyard to build ships are not synonymous. The capacity to build ships denotes the physical industrial facilities available such as ways, drydocks, piers and buildings which are necessary for all stages of design and construction. The capability to build ships refers to a shipyard organization encompassing the appropriate design and industrial trades for the specific ship to be designed and constructed as well as the appropriate manning of the shipyard work force in terms of the specific skill and experience levels being employed.

Submarines are unique in that they have no counterpart in the non-defense sector. The aircraft industries have both a commercial and defense aircraft line. There exists some degree of comparability in commercial and defense surface ships. No such comparability exists for submarines. The techniques, standards, fabrication processes, etc. for designing and constructing submarines, whether they be diesel or nuclear power, are unique to submarines. For this reason, the capacity of a specific shipyard to build ships in general cannot, in all cases, be directly translated into the capability of that shipyard to build submarines.

With this as a point of departure, the Israeli Navy has contacted the U.S. Navy and did indicate the necessity of starting the planning for their new generation submarine and did cite the Israeli preference to build those diesel submarines in this country. The Israeli Navy had already contacted various U.S. shipyards and had identified the Quincy Division of General Dynamics as being interested and willing to build the Israeli submarines.

The Israeli request was denied strictly on the basis of the envisioned impact that building those submarines would have on our own submarine building program. Of specific concern was the potential drain on the limited talent base by another new design program—the first being our own new design nuclear attack submarine—which would seriously affect our own programs. The U.S. submarine design and construction capabilities are already being constrained by the available trained manpower pool represented by the Naval Sea Systems Command, in our supporting Naval laboratories and field activities, and at our two private new construction shipyards, Electric Boat and Newport News.

This denial would be the case no matter which U.S. shipyard had been considered by the Israeli Navy, but it would perhaps be more acutely felt by the selection of the Quincy Division. No existing submarine design and construction talent is resident at Quincy, its last submarine having been delivered in 1968. Quincy's only recourse would be to hire from existing yards where U.S. submarine work is now in progress. For Quincy, the probable source of talent would be its sister shipyard, Electric Boat Division of General Dynamics. Electric Boat is building both the SSN-688 and Trident classes, is the design agent for the Trident class, is the planning agent for several older classes of U.S. submarines, and will be a major contender for the design of the new design nuclear attack submarine. Any impact at Electric Boat caused by an effort such as that proposed by the Israeli Navy is viewed with considerable concern. Electric Boat is only now recovering from serious new construction problems. Any diversion of corporate management attention or design or construction talent could wipe out the gains Electric Boat has made and would seriously impact U.S. Navy programs at that yard.

Thus while the Quincy Division of General Dynamics may have the capacity to build ships in general and, perhaps even the capacity to build submarines, it definately does not have the capability to build submarines.

As for the South Korean request, it was envisioned that any deviation of design talent, no matter the source, would have an unacceptable impact on the in-progress design effort for the U.S. new design nuclear attack submarine.

Senator **Cohen**. Admiral Thunman, before you begin with your formal presentation, maybe you might begin by answering Mr. Polmar's questions. What happened between 1981 and 1982?

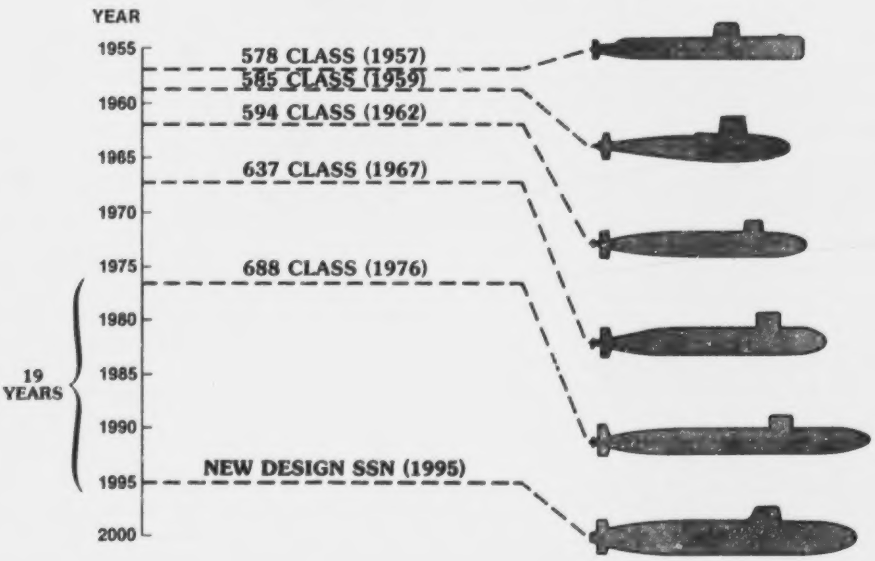
STATEMENT OF VICE ADM. N. R. THUNMAN, USN, DEPUTY CHIEF OF NAVAL OPERATIONS, SUBMARINE WARFARE

Admiral **Thunman**. I will try to answer that as we go along with the presentation.

I certainly appreciate having the opportunity to discuss the No. 1 research effort and development program that we have in submarines. I will also try to answer Senator Hart's questions as I go along, but with your permission, I will also provide answers for the record so that I can completely respond.

Before going into specific characteristics of the new design, let me talk about nuclear attack submarine development in our Navy over the last 20 years, and briefly review the history.

The New Design SSN: An Historical Perspective



Our first class of nuclear attack submarines was the 578 class. In 1959, or shortly thereafter, the *Skipjack* class came into the fleet, a modern hydrodynamic submarine much more powerful, faster, and more capable.

Then came the 594 class, or the *Permit* class as we call it today. The *Permit* class came into the force in 1962. This was a major step forward in submarine design, significantly quieter with a much improved sonar and combat system. As a matter of fact, this is the very first truly capable ASW platform in our submarine fleet.

In 1967, we introduced the *Sturgeon* class, the 637 class. It was a little bit better in quieting than the 594. It had some improvement in its combat systems. It was mainly larger so that we could improve combat capabilities of the ship.

We were able to add some missions that were left out of the 594 class, missions such as reconnaissance. We have 39 of these ships in the fleet today. They are capable ships. We are modernizing them as much as we can. For example, we are going to make them capable, and we have some now capable, of shooting the Tomahawk cruise missile.

In 1976, the 688 class, the *Los Angeles* class, entered the fleet. It was a good submarine designed primarily as a battle-group escort. Since that time, we have worked to improve that ship, to do all that we can to counter the threat through improvements.

We have also done things to improve capabilities that were left out. For example the issue of mining was raised, and it is true that initially the 688 class submarine was not designed as a mine layer. We had a large number of submarines which were capable of mining. We have recently taken steps to put the mining capability not only into the new construction 688 class ships, but to backfit it into the older 688's.

Senator COHEN. It seems to me that you get caught in the crossroads many times. On the one hand, we have criticism of the Navy for trying to do too much in one ship, and making it all-purpose. Then, when it is not all-purpose, critics say, well, you have the 688 and it can't lay mines.

I am not sure which way you ought to go, whether you ought to have specialized ships, or one ship that does everything.

MULTIMISSION NUCLEAR ATTACK SUBMARINE

Admiral THUNMAN. I strongly favor the multimission nuclear-attack submarine, the submarine that is ready to carry out our maritime strategy, and I will try to discuss that as I go along.

What happened to cause us to move into the new design submarine program? Clearly, the threat improved and I will show you that as we go along; 2 years ago, the Secretary of the Navy, who had seen the evidence of the improvement in the threat, directed that we start conceptual design of a new design nuclear attack submarine.

We keenly sensed our responsibilities in putting together a group that could come up with the right characteristics for the new design. We put together a group called Group Tango, which consisted of the very best submarine-design engineers, as well as submarine operators here in the Washington area. I was the head of the group. It consisted of a lot of very bright and very capable submarine people in both design and operations.

Senator COHEN. If you would, Admiral, what was it specifically that caused the Secretary—or did you say the CNO?

Admiral THUNMAN. The Secretary of the Navy started with a memorandum to the CNO.

Senator COHEN. What was it that caused, or what breakthrough in the threat was it, that prompted the change? Admiral Hayward had the same access to intelligence information that Secretary Lehman and others have. What breakthrough did we learn of recently? Didn't the *Mike* and the *Sierra* come onboard much sooner than anticipated?

Admiral THUNMAN. Yes.

Senator COHEN. What specifically caused us in the interim to say that the Soviets have some new development to which we have to respond?

Admiral THUNMAN. The quieting of their submarines, and I will cover this in great detail in our closed session. It was clear in the 1981 time frame that significant improvements had been made.

When I was commander of the Submarine Force-Pacific during the years of 1980 and 1981, it was very clear that we were losing our advantage, as Mr. Polmar discussed. Putting all of the facts together, it was also clear we had to move toward a new design, and I will cover that more completely in the closed session.

The group that we put together to develop the conceptual design first looked at all of the intelligence that we had to determine the characteristics we needed to counter what we felt that the Soviet

Union would produce in the 1990's and beyond and what they are producing now.

Then we turned to the research and development community, and surveyed every program that we had available that could improve our characteristics and produce a ship that would counter the threat. We put together a conceptual design, and then we started discussing that design, both in and out of the Navy, inviting everyone that we could to review it and to make inputs.

We have had that design before our CNO executive board, and the naval studies board of the Academy of Sciences. We presented it to industry on several occasions, both to the National Security Industrial Association, as well as special groups of leaders of most of the major companies involved in submarine design, so that they knew in what direction we were heading. We asked that they make inputs so that we knew exactly what was available and what we could achieve.

Senator COHEN. Mr. Polmar mentioned that he had talked with several groups that had some additional ideas. To your knowledge, were these groups or individuals ever contacted or ever play a part in the recommendations concerning the design and capabilities of the ship?

Admiral THUNMAN. Sir, I don't know to what group he was referring.

I never turn away anybody from my door. I have talked to several people in industry, and our organization has talked to several people in industry. We have had a lot of industry involvement not only on the design of the new submarine, but in the design of the various components of the submarine. For example, the SUBAC system is a system competed between two companies in industry, and their inputs have been sought and received.

We have tried to get every expert opinion that we could obtain from technical experts existing in industry to provide us with the characteristics that we need for the submarine, and to provide us inputs so that we can achieve these characteristics.

Senator COHEN. Is there any objection to constantly having input?

Admiral THUNMAN. No, sir.

Senator COHEN. To getting more expert information, rather than settling on an idea that you and others might have thought of?

Admiral THUNMAN. No, sir. Again, I have made a personal plea in my last session before the National Security Industrial Association, with some 300 or 400 people sitting out there in the audience. I asked them personally to come and see me if they had something that they felt was worthwhile. I have had several come to see me.

I would also point out that there are several higher classified programs ongoing which brought inputs into this new design that we can't address until we get into the closed session.

Mr. CANN. To help put this evolution a little bit more into perspective or a more complete perspective, another part of this process for some time now—over the 10-year period 1970 to 1980, we had a very difficult time in trying to introduce any new submarine designs, because the submarine force, with the 594, 637 and 688 classes, had been so successful.

Our submarines were so good relative to other submarines that we found it difficult, in the process that we live in, which is to go to the OSD on any type of activities, to justify a major new submarine effort. But one of the efforts that we did start back around 1976, in addition to beginning the submarine-combat system, was a program called improved machinery.

We recognized that the 688 was two-thirds machinery, so to speak, and we started a very aggressive program, and we got everybody from the industry involved, to look at how we could best improve the powerplant—not the nuclear powerplant, but the rest of the machinery in the submarine, to get about a 40-percent weight reduction and a volume reduction, and also to get quieter.

What has happened in the last few years, as we made design choices, some of those people have fallen by the wayside, and the people who have succeeded in that effort over the last 6 or 7 years find their components being designed into this current new design.

Senator COHEN. I raise the issue because Mr. Polmar, and I think even Dr. Friedman, somewhat, is in accord with the concept that "Better is the enemy of good enough." I asked Dr. Friedman to tell me why this ship is superior or different from all other ships. It is essentially evolving in the same direction. The question can always be asked, why are we going to a new ship if we can improve what we have or do better with what we have, unless we are prepared to make a significant leap forward. I tend to agree with that general approach.

The difficulty involved in all of the associated statements about not going for the best, according to Dr. Friedman and others, is that the Soviets are emerging with all kinds of new designs.

The Soviets, based on what I have seen, are doing an awful lot of experimental work with a whole variety of ships. They are not evolving slowly, they are really dramatically proliferating.

Admiral THUNMAN. Let me say, we did receive authorization to go forward with preliminary design last year, after review of our conceptual design by our operational commanders, our fleet commanders, within the Navy and within OSD.

That preliminary design is ongoing now. We are shooting for a 1989 authorization and for the lead ship to enter the fleet in 1995. I would point out that when that lead ship does enter the fleet, it will be some 19 years after the first 688 entered our force.

SUBMARINE WARFARE
KEY TO FORWARD NAVAL STRATEGY

- OPERATE IN CRITICAL OCEAN AREAS
- EXACT HEAVY ATTRITION AGAINST SOVIET FLEET
- THREATEN LAND TARGETS WITH LAND ATTACK CRUISE MISSILES
- OCCUPY ENEMY SUBMARINES IN DEFENSIVE MISSIONS
- CARRY THE NAVAL OFFENSIVE TO THE ENEMY

What is the mission of our submarine force? Our maritime strategy calls for a majority of our submarine force to go forward at the beginning of any armed conflict with the Soviet Union, to sink his fleet, bottle up his massive force of attack submarines in his home waters, and to threaten his land targets with Tomahawk cruise missiles.

We will also use some of our nuclear attack submarines to provide support and protection to carrier battle groups as they operate worldwide, conducting forward naval offensive strategy.

SOVIET SURFACE COMBATANT FORCE

What is the threat we see? We see an improving Soviet surface combatant force. Here is a picture of the Soviet *Kirov*-class cruiser, and we would expect our submarines to take out these ships as they move forward into Soviet home waters.

We also see an improving Soviet naval air ASW capability. This shows a Bear *Foxtrot*, which has an enhanced ASW capability, and a good long-range capability. Our submarines would have to survive in an environment controlled by Soviet naval air. It is important that they have the capability to operate in that evironment.

Finally, we see a massive Soviet submarine force, a force where more new designs are coming into the force each year. We talked earlier about the *Sierra* and the *Mike* classes, bigger, more capable nuclear attack submarines that we saw entering their fleet as new classes last year.

Their ships are quieter, significantly quieter, they have better sensors, some dive deeper and operate at higher speeds, and a lot of these things together, including improved weapons such as the submarine launched cruise missile, indicate to me that they have new missions.

Let me compare our force qualitatively with their force. This chart compares the kill ratios across time. It compares our submarines versus their submarines as they move from generation to generation. When I was a submarine commanding officer in the late sixties, we had a very high kill ratio as compared to the Soviet first generation submarines. We would kill a lot of his submarines for every one of ours that he would kill.

We brought on the 688-class SSN at the same time they were bringing on their second generation, and the kill ratio decreased. This shows the improved 688 class versus their third generation. We still have a positive advantage, but again it has decreased.

This major issue is that this improved 688 class versus the fourth generation of Soviet submarine, the one that we expect to see on their fleet in the nineties, will not have a high enough kill ratio for us to prevail in future conflicts with the Soviet Union. We need now to move forward to a new design in order to restore that advantage; the advantage that Mr. Polmar described.

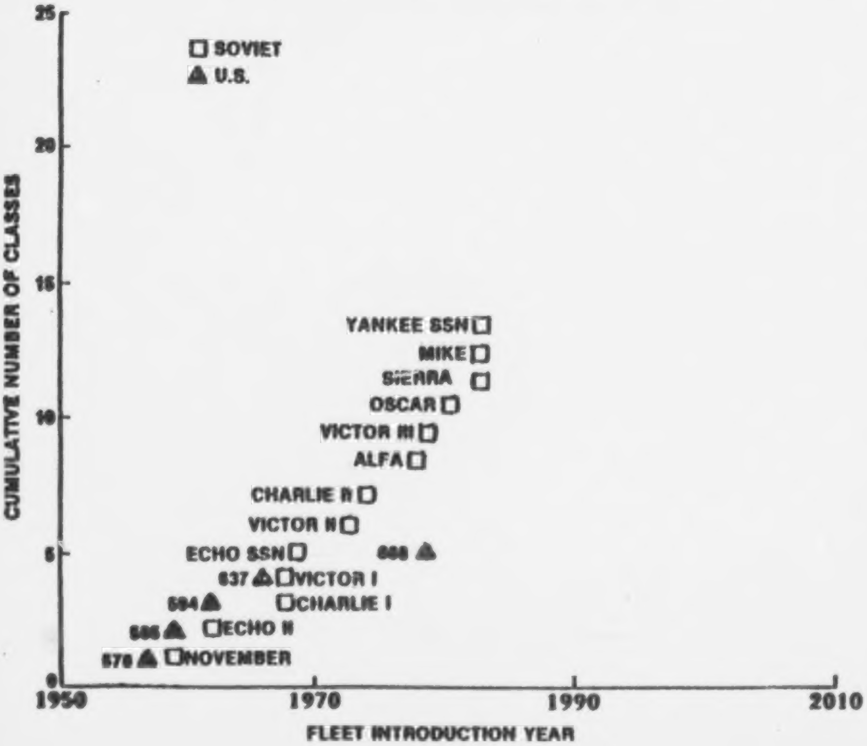
Senator Cohen. In terms of numbers, what is that ratio?

Admiral Thunman. I would like to discuss that in closed session, and then I could give you some numbers.

Senator Cohen. It has to be taken into account that these are 3-to- 1 ratios that we are facing now, and what that means in terms of numbers, and why the 100 becomes the minimum and not the maximum.

Admiral Thunman. I will provide you with that in closed session.

U.S. and Soviet Nuclear Attack Submarine New Class Introduction



What have we seen in their fleet as regards introduction of the new classes of submarines? This chart shows the introduction of our classes, as I discussed, from the 578 to the 688 class in 1976. The boxes show the introduction of the new classes into their force. I would note that since 1976, they have introduced six new classes of nuclear attack submarines into their force.

Last year, they introduced three, the *Sierra,* the *Mike,* and the converted *Yankee* SSN, all very large and very capable, and we project them to be extremely quiet submarines. Their policy is to rapidly incorporate new technology into their force as it becomes available, and they are not limited by funds.

Another example here is the difference between the *Charlie II* and the *Oscar* class. *Charlie II* is a cruise missile firing nuclear attack submarine that came into the force in the early seventies. The *Oscar,* which is now in the force, is a much bigger ship that carries a lot more cruise missiles. The cruise missiles themselves have a better capability. They have been able to quickly insert that capability in their fleet in a short period of time.

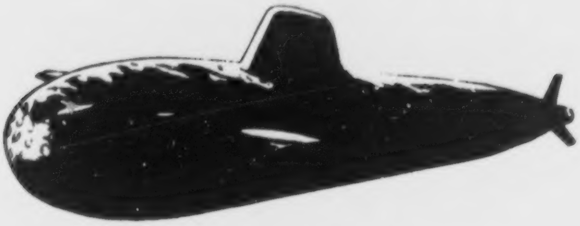
Senator COHEN. Are you going to show in open session the contrast between size, or is that for the closed session?

Admiral THUNMAN. In the closed session.

Senator COHEN. There has been a lot of discussion of why we build bigger subs as compared to what has taken place with the Soviet ships.

Admiral THUNMAN. I would like to say that these Soviet submarines are in most cases as big or bigger than our new design submarine. So we have not moved beyond the Soviets as regards to size of their submarines. These last four are very large and capable submarines. In my view, they are large because of the things Dr. Friedman has discussed: the need for quieting, and also the need for improved fire power.

SSN-21 Class



COMBAT FEATURES

- QUIETER
- MORE EFFECTIVE COMBAT SYSTEM
- HIGHER TACTICAL SPEED
- MORE FIREPOWER
- BETTER ARCTIC WARFARE CAPABILITY
- LARGER OPERATING ENVELOPE
- IMPROVED CONTROLLABILITY
- INCREASED SURVIVABILITY
- GREATER MISSION FLEXIBILITY
- GROWTH POTENTIAL
- SSN 688 CREW SIZE

What are the characteristics of our design submarine? This chart shows the combat features. Note that we call it the SSN-21 class because it is the submarine of the 21st century. We designed this submarine to combat the Soviet threat in the nineties and beyond, that is the part to consider.

It is several times quieter than today's 688 or the improved 688. It has a much more effective combat system. It will have a variant of the advanced submarine combat system, SUBACS as you know it, the system now being produced by IBM. That is one of the major systems that was competed for our submarines in the last few years.

It will have a very high tactical speed, and this is an important area in submarining. If you have a high tactical speed, it means that you can proceed at a high speed while you search, track, detect, and attack your target without fear of him detecting and attacking you.

This submarine has a very high tactical speed because of the improved quieting that we have put in the ship, as well as the improved sensors that we have put in the ship. It has significantly more fire power, more tubes, and more weapons. There is also growth in our weapon system area.

SUBMARINE "DOGFIGHT"

Senator COHEN. When you say that it has higher tactical speed, how does that pertain to the word "dogfight" that we talked about for most of the morning?

Admiral THUNMAN. Let me say first, if the submarine gets into a dogfight, and we hope it doesn't because that is the worst situation in submarine warfare, it will be much better than any submarine we have today in a dogfight.

It will have a lot more fire power. It will be a lot quieter. It will be more maneuverable because of the improved controlability and agility that we have designed into the ship. In a dogfight, it will be much better than anything we have or anything that I see coming down the line.

Senator **Cohen**. Senator Hart raised the question about "is it the optimal design to deal with dogfight?" What is the optimal design for a dogfight? Is it to have more weapons or to have fewer weapons? Is it to have more speed? What is the tradeoff in terms of having a ship optimally designed for a dogfight?

Admiral **Thunman**. The optimum design for dogfighting is quieter, a lot of fire power, and the ability to shoot a large number of torpedoes in salvo.

Senator **Cohen**. When you say, "higher fire power," does it mean bigger size or smaller size?

Admiral **Thunman**. The submarine will have to be bigger in order to have more fire power, to carry more weapons, and to have more torpedo tubes. In order to have the quieting that you need to prevail in the dogfighting, or meleee situation--which is another way of saying it—the submarine will be bigger. You will need an improved control system in the ship.

Here on the chart [deleted] you can see an artist's conception of the planes, the control systems and control surfaces in the SSN-21 class differ from those that we have in today's submarines. The optimal submarine for dogfighting, or the melee situation, is one which has all of these elements and, in my view, it would be a bigger submarine

Senator **Cohen**. When you start talking about dogfighting capability, one immediately thinks of smaller, more maneuverable, faster, deeper diving. What you are saying, contrary to that layman's approach, is just the opposite. You need something that has more fire power, and that necessitates greater size; something that is quieter, which also necessitates greater size.

Admiral **Thunman**. Yes, sir.

Senator **Cohen**. So we are evolving toward this class of submarines, which may be or may not be optimal, whatever that word means in this context, but nevertheless is desirable. Am I wrong in that statement?

Admiral **Thunman**. No, sir, it is a correct statement.

I was going to point out that the thrust of our entire submarine program, from the very beginning was to be very quiet, and to have very good sensors. That of course, tries to obviate ever getting into a dogfight situation, because if you do, you need an acoustic advantage over him. If you don't have that acoustic advantage, you are going to lose. That is something that we can get into in detail in closed session.

Senator **Cohen**. It raises a question as to what the primary threat is going to be. Dr. Friedman indicated that "dogfight" is not something that the Soviets had in mind as a major mission, but it may be incidental to their major mission. So you don't design ships solely to engage in dogfights, but rather have the capability that could engage in dogfights if forced to do so.

Admiral THUNMAN. Yes, sir.

I would say that we have designed this submarine, again, to detect him, to be able to track him, to be able to attack him before he detects and attacks us, and before we get into the melee or dogfight situation.

This submarine has a better arctic warfare capability than our 688 class today, not only in its hull configuration, but in the systems that we have put into its combat system.

Senator COHEN. There was an article in U.S. News & World Report talking about arctic warfare, dogfighting warfare in the arctic. What is your response to that article?

Admiral THUNMAN. I read the article. It indicated that we were not preparing to go up and fight in the Arctic. On the contrary, we are. This submarine has an excellent arctic capability, several times the capability of today's 688 class, or the improved 688 class, because of the quieting that we are putting into the ship.

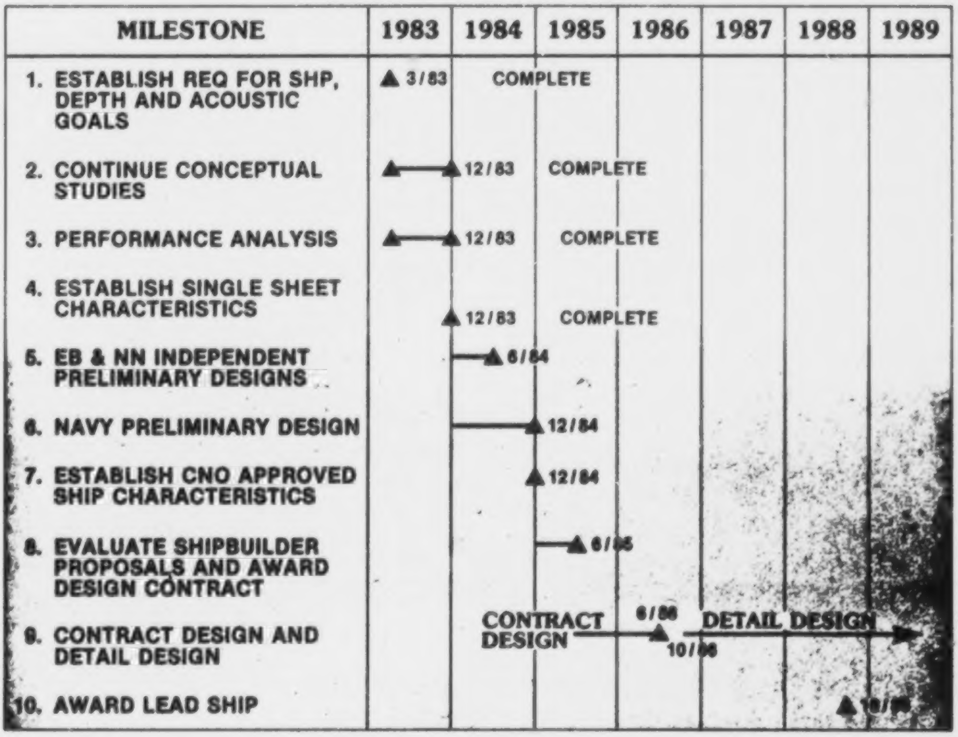
Sound travels a little bit differently when operating there, so you have to put in significant quieting if you are going to go up there and be able, again, to detect that target and attack him before he detects and attacks you. We have given careful consideration to that capability, and this submarine has an excellent capability for arctic warfare.

I would also say that we have a good capability now in the Arctic. That article indicated that possibly we didn't. My view would be that we do, and we are working to improve it year by year through exercises.

The ship will have a larger operating envelope. It will be faster and dive deeper than the 688. I discussed its improved controlability, and all of these things together will improve the survivability of the ship. They give it the capability to go out and carry out our maritime strategy, to go deep in his home waters and do a lot of damage over a long period of time.

Then, of course, our commanders will have a greater mission flexibility in the use of the submarine. We have designed it with growth potential for the weapon systems and the sensor systems, as well as in its operating envelope. Finally, we will operate this ship with the same crew size as today's 688, which is 102 officers and enlisted men.

New Design SSN Time Line



Where are we in the design process? As I discussed earlier, we have completed our conceptual studies, and we have moved into preliminary design. We have the Electric Boat Co. and Newport News both conducting preliminary designs of the submarine, at the same time Navy is conducting a preliminary design.

In December of this year, we will put together the final preliminary design, and by June 1985, we hope to be able to award the design contract. Again, our plan is for a 1989 authorization, with introduction in the fleet in 1995.

Senator COHEN. What is the consequence of a 1-year slip on that?

Admiral THUNMAN. It would be a year late getting into the force, but I believe we are 5 or 6 years late now. The threat is such that if we don't move now and do the things we need to do in research and development, we are going to get so far behind we are never going to be able to recover. We have an advantage today, but we are losing that advantage, and I think everyone has said that.

Senator COHEN. I am told, for example, Admiral, that there have been significant changes in design from 1983 to 1984 based upon the kind of expert input that you have been receiving, and that you have made a number of significant changes to try and anticipate the breakthroughs that the Soviets have made in their own submarine warfighting capability.

It may be that we are falling behind substantially, but given the kind of changes that have been made in the past year, is it, in your judgment, worth the risk to pursue the kind of changes that could come out of more consultation?

What is the tradeoff between further delay and possible further improvements like you have had from 1983 to 1984?

Admiral THUNMAN. I don't know of anything else that we could put into new submarine design that would make it a more capable submarine, a significantly more capable submarine to operate against their ships in the 21st century.

Again, I would like to emphasize that we looked at everything available. We went hand over hand through all of the research and development program, and we put together, in my view, a very highly capable submarine which will do the job.

Senator COHEN. I had another meeting at 12, and it has already started. So perhaps you could conclude in 5 minutes.

Admiral THUNMAN. Let me finish by saying that our fiscal year 1985 request for submarine R&D includes some $686 million to support our entire submarine platform R&D program. Of the $686 million, about $170 million is involved with focusing certain research and development programs so that we can have a 1989 authorization and fleet entry in 1995. We request your support of those programs, sir.

Senator COHEN. We will conduct the rest of your presentation in closed session. We will declare a 10-minute recess to clear the room.

Mr. CANN. While you are still in open session, I would like to ask your permission to provide some kind of a statement in the record. There was a comment made about building the DDG-51, and I would like to make some some kind of a statement about our views on that subject.

Senator COHEN. I expect that we will have an entire session on the DDG-51 next week or the week after. We will also have a session on the cruiser.

Perhaps, in the open session, I might ask you, Admiral Thunman, what is your reaction to Mr. Polmar's belief that we could get three diesels in a tradeoff trade for one nuclear sub, and that it would be a good thing to consider. Three diesels for one nuclear is perhaps something we ought to give serious consideration.

Admiral THUNMAN. We do not believe that we would be able to get three diesel submarines of the type that we want, or that we would consider for the price of one nuclear attack submarine.

We don't have a mission for the diesel-electric submarine in our Navy. It cannot meet our maritime strategy. It does not have the covertness, the endurance, the mobility, the fire power, or the sensors to do the job that our attack submarines must do, and I will be able to cover this a lot in the closed session.

Senator COHEN. You heard Mr. Polmar saying, and Dr. Friedman also, that they would like to have a lot more submarines. Could diesels not be considered in addition to, rather than as a substitute for, nuclear submarines?

In other words, is there no role that you can envision for having diesel submarines with some limited capability in some of the lower threat areas, as opposed to going head to head with the Soviets under the Arctic icecap?

Admiral THUNMAN. We have our allies to support us in those areas where you might use diesel-electric submarines. I think they could provide us effective support for the mission for which they are designed. I am talking about our allies' submarine mission, which is barrier operations close to their homelands, where they are not opposed by effective ASW aircraft.

They would provide us effective support specifically against the Soviet surface fleet. I don't think that they would have any capability or very good capability against today's quiet, high-speed, modern, nuclear-attack submarines.

Senator COHEN. What you are saying is, No. 1, you couldn't get a 3 to 1 tradeoff; No. 2, if you could, you still wouldn't like it.

Admiral THUNMAN. Yes, sir.

Just to show you that we have talked about this in the submarine force a lot, I asked Admiral Bud Kauderer, who is Commander of the Submarine Force-Atlantic, to provide me his thoughts. This is a secret letter which I will provide for the record, but I would like to read a few of the excerpts in the letter which are unclassified. Let me quote:

> As an insular nation, we are faced with great distances, 3,000 to 6,000 nautical miles which must be traversed safely to reach potential war patrol zones. Vulnerability to detection and prosecution during such transits, and timely arrival at the scene of action dictate that an investment in diesel submarines, from my respective as an operational commander, would be unwise.

Then he goes on to say:

> There is no free lunch. I estimate that a modern diesel submarine, constructed in U.S. shipyards, would run at almost two-thirds of the unit production costs of the SSN-688. Again, from the point of view of the major operator of our submarine forces, that differential in initial costs pales to insignificance when compared with the difference in war fighting capability available in an SSN. I ask that you continue to support an aggressive SSN-building program against the strategic and tactical threat I face at sea today. I do not have a mission for the diesel submarine.

[The letter follows:]

COMMANDER, SUBMARINE FORCE,
U.S. ATLANTIC FLEET,
Norfolk, VA, February 15, 1984.

DEAR ADMIRAL THUNMAN: In my letter to you of 23 January 1984, I discussed recent events in which the high speed capability of SSN 688 class submarines contributed to the overall success of the operation. The utility of [deleted] continues to provide convincing proof that we should not spend our limited defense dollars on diesel powered submarines for the U.S. Navy. As an insular nation, we are faced with great distances (3,000 to 6,000 nautical miles) which must be traversed safely to reach potential war patrol zones. Vulnerability to detection and prosecution during such transits, and time late arriving at the scene of action, dictate that an investment in diesel submarines, from my perspective as an operational commander, would be unwise.

We continue to observe the unpredictability of the Soviets. The current "analogous response" patrols of [deleted] SSBNs in the mid-Atlantic reaffirms my conviction that we must be prepared to go wherever they may be. We must have the ability to respond [deleted] inherent only in an SSN, even into their [deleted] an environment denied to the diesel submarine.

A conventionally powered submarine, no matter how "state of the art," has no capability to maintain contact on the current threat. Future Soviet submarines will be even more difficult to counter. Our recent experience [deleted] highlights the intrinsic limitations of diesel submarines.

There is no free lunch! I estimate that a modern diesel submarine, constructed in U.S. shipyards, would run to almost two-thirds of the unit production cost of an SSN 688. Again, from the point of view of the major operator of our submarine forces, that differential in initial cost pales to insignificance when compared with the difference in war fighting capability available in an SSN. I ask that you continue to support an aggressive SSN building program. Against the strategic and tactical threat I face at sea today, I do not have a mission for the diesel submarine.

Very respectfully,

B. M. KAUDERER,
Vice Admiral, U.S. Navy.

Senator COHEN. Thank you very much, Admiral.

I am going to reschedule the closed session in view of the fact that we are running so late, and I have some other commitments that are pending right now. I think there are some issues that we will want to go into at great length for the record, so that there is no mistake as to where we are going with this.

Thank you all very much. The meeting stands adjourned.

[Whereupon, at 12:38 p.m., the subcommittee adjourned.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

THURSDAY, APRIL 5, 1984

U.S. SENATE,
SUBCOMMITTEE ON SEA POWER AND FORCE PROJECTION,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NAVY PROCUREMENT AND SHIPBUILDING PROGRAMS

The subcommittee met in open session, at 9:40 a.m., in room SR-232A, Russell Senate Office Building, Senator William S. Cohen (chairman) presiding.

Present: Senators Cohen and Stennis.

Staff present: Alan R. Yuspeh, general counsel; Arnold L. Punaro, staff director for the minority; L. Wayne Arny III, William E. Hoehn, Jr., Mark B. Robinson, professional staff members; and Kathleen L. McGuire, staff assistant.

Also present: James H. Dykstra, assistant to Senator Cohen; Dale F. Gerry, assistant to Senator Cohen; Bernard R. Toon, assistant to Senator Quayle; John Roddy, assistant to Senator East; Mark J. Albrecht, assistant to Senator Wilson; Francis J. Sullivan, assistant to Senator Stennis; William S. Lind, assistant to Senator Hart; and James Steinberg, assistant to Senator Kennedy.

OPENING STATEMENT BY SENATOR WILLIAM S. COHEN, CHAIRMAN

Senator COHEN. The subcommittee will come to order.

Today we are meeting to receive testimony on the Navy's procurement programs that fall under the jurisdiction of the Sea Power and Force Projection Subcommittee. These programs include shipbuilding and conversion, aircraft procurement, weapons procurement, and other procurement.

On behalf of the subcommittee, I am happy to welcome all of our witnesses here today: Vice Adm. Bob Walters, Deputy Chief of Naval Operations for Surface Warfare; Vice Adm. Ron Thunman, Deputy Chief of Naval Operations for Submarine Warfare; Vice Adm. Robert Schoultz, Deputy Chief of Naval Operations for Air Warfare; Vice Adm. Earl Fowler, Commander of the Naval Sea Systems Command; and Capt. Jack Donegan, the Aegis Combat System Project Engineer.

I am happy to extend a similar warm welcome to our two outside witnesses here today, Congressman Denny Smith from Oregon, and Dr. Norman Friedman, physicist, deputy director of national security studies at the Hudson Institute, and author of several books, including "Carrier Air Power," "Modern Warship Design and Development," and "Naval Radar."

We intended to have Mr. Charles Watt representing the Defense Department's Office of Test and Evaluation, but he could not be present today. We will hear testimony from him next week.

Gentlemen, I expect that most of our time this morning will be consumed by a review of the Aegis weapons system and the request for the lead ship of the *Arleigh Burke* [DDG-51] class of guided missile destroyer. But we do have to address several other items of business.

First, we will hear from the Navy on their procurement budget; then from Congressman Smith; then from Dr. Friedman; and then from the Navy again.

I intend to move into a closed session after the unclassified portion of our hearing is completed.

Senator Stennis, do you have any opening remarks you would like to make?

Senator **STENNIS**. Thank you. Yes, I do.

I am, of course, interested in all of this Navy program. I am going to stay as long as I can with you today. We are starting the 10th time around on the same subject matter over on the floor, that is, El Salvador. I am on duty there. I will stay here just as long as I can.

Later, before you close the hearing, Mr. Chairman, I may have something to say.

Thank you very much.

Senator **COHEN**. Thank you very much, Senator Stennis.

Admiral Walters or Admiral Fowler, would you please begin? You may proceed in any manner you prefer.

Admiral **WALTERS**. I think we would prefer to have Admiral Fowler go first.

Senator **COHEN**. Very well.

Admiral Fowler?

STATEMENT OF VICE ADM. EARL B. FOWLER, JR., USN, COMMANDER, NAVAL SEA SYSTEMS COMMAND

Admiral **FOWLER**. Mr. Chairman and members of the committee, thank you for affording me this opportunity to report on the Navy's shipbuilding programs.

I am pleased to provide an optimistic report for the third consecutive year.

My prepared testimony, which I wish to submit for the record, with your permission, Mr. Chairman, covers the details, but I would like to summarize a few thoughts.

Our goal of a 600-ship Navy is nearing accomplishment. We will have 525 ships by the end of this year, and 545 ships by the end of next year. These levels will be achieved with funds already appropriated.

As of March 15, 1984, there were 115 naval ships under construction or conversion in 18 different U.S. shipyards.

The fiscal year 1984 program shipbuilding contracts have been awarded, except for one FFG and one MSH. Savings in our fiscal year 1984 program have been made by bringing shipbuilding contracts in under budget. Increased competition has helped.

Three years ago, only 26 percent of our ships were competitive awards. This year, competition has increased to over 86 percent.

Keen competition has caused improvements in design and fabrication techniques to further reduce cost by improved productivity. Shipyard performance continues to improve. Quality and schedule adherence are good and cost trends are favorable.

The FFG program at Bath Iron Works is an example of exceptional performance with early delivery and under target cost. We have saved more than $100 million on the first 15 follow ships of the *Perry* class guided missile frigates. These are real savings because the price of each of these ships was arrived at by competition among three good yards.

Business relationships between the Navy and private shipyards are good, generally, and improving.

Your strong support and the thoughtful guidance of you and the committee has contributed in very large measure to this optimistic report, for which I am very grateful.

That concludes my prepared statement.

Senator COHEN. Your full statement will be included, Admiral Fowler, and perhaps we will return to it during the course of our questions later today.

[The prepared statement of Admiral Fowler follows:]

Prepared Statement of Vice Adm. Earl B. Fowler, Jr., USN, Commander, Naval Sea Systems Command

Mr. Chairman and members of the committee: I am Vice Admiral Earl B. Fowler, Commander, Naval Sea Systems Command.

It is a pleasure to appear before you today to discuss the Navy Shipbuilding Program. I have included some charts to make the information presented easier to understand.

NAVY SHIPBUILDING PROGRAM

- Status of Current Navy Shipbuilding Program
  - Major Private Shipyards and Shipbuilding Workload
  - Delivery Assessment
- Capacity and Capability of Private Industry
  - Projected Navy Workload for Private Shipbuilders
  - Supporting Industry
- Arleigh Burke Guided Missile Destroyer
- Status of the Public Shipyards
- Status of Overhaul Improvement Efforts
- Summary

CHART 1

Chart 1 contains an outline of the subjects covered in this statement. First I will cover the status of the Navy's current shipbuilding program and the capacity and capability of private industry to execute the FY 85-89 shipbuilding plan. Then, I will cover the status of public shipyards and discuss the shipyard overhaul improvement effort. Finally, I will summarize.

PRIVATE SHIPYARDS AND NAVY CONSTRUCTION PROGRAMS
(15 MARCH 1984)

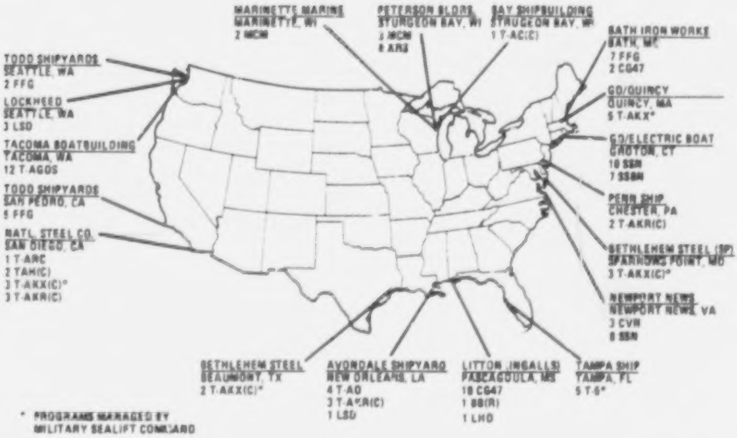

MARINETTE MARINE
MARINETTE, WI
2 MCM
PETERSON BLDRS.
STURGEON BAY, WI
3 MCM
8 ARS
BAY SHIPBUILDING
STURGEON BAY, WI
1 T-AC(C)
BATH IRON WORKS
BATH, ME
7 FFG
2 CG47
TODD SHIPYARDS
SEATTLE, WA
2 FFG
LOCKHEED
SEATTLE, WA
3 LSD
TACOMA BOATBUILDING
TACOMA, WA
12 T-AGOS
TODD SHIPYARDS
SAN PEDRO, CA
5 FFG
NATL. STEEL CO.
SAN DIEGO, CA
1 T-ARC
2 TAH(C)
3 T-AKX(C)*
3 T-AKR(C)
GD/QUINCY
QUINCY, MA
5 T-AKX*
GD/ELECTRIC BOAT
GROTON, CT
18 SSN
7 SSBN
PENN SHIP
CHESTER, PA
2 T-AKR(C)
BETHLEHEM STEEL (SP)
SPARROWS POINT, MD
3 T-AKX(C)*
NEWPORT NEWS
NEWPORT NEWS, VA
3 CVN
8 SSN
BETHLEHEM STEEL
BEAUMONT, TX
2 T-AKX(C)*
AVONDALE SHIPYARD
NEW ORLEANS, LA
4 T-AO
3 T-AKR(C)
1 LSD
LITTON (INGALLS)
PASCAGOULA, MS
18 CG47
1 BB(R)
1 LHD
TAMPA SHIP
TAMPA, FL
5 T-5*
* PROGRAMS MANAGED BY
MILITARY SEALIFT COMMAND

CHART 2

Within the private sector, there are 18 shipyards currently building or converting ships for the U.S. Navy. These shipyards and their Navy order book are shown in Chart 2.

NAVY SHIPS UNDER CONSTRUCTION OR CONVERSION
(15 MARCH 1984)

SHIPTYPE	QTY	SHIPYARD
AIRCRAFT CARRIER (CVN)	3	NEWPORT NEWS
GUIDED MISSILE CRUISER (AEGIS) (CG)	12	INGALLS, BATH
AMPHIBIOUS ASSAULT SHIP (LHD)	1	INGALLS
LANDING SHIP DOCK (LSD)	4	LOCKHEED, AVONDALE
GUIDED MISSILE FRIGATE (FFG)	14	BATH, TODD LA & TODD SEATTLE
MINE COUNTERMEASURES (MCM)	5	PETERSON, MARINETTE MARINE
FLEET OILER (T-AO)	4	AVONDALE
TANKER (T-5)	5*	TAMPA SHIP
CABLE REPAIR SHIP (T-ARC)	1	NATIONAL STEEL
SALVAGE SHIP (ARS)	4	PETERSON
OCEAN SURVEILLANCE (T-AGOS)	12	TACOMA BOAT
FLEET BALLISTIC MISSILE SUBMARINE (OHIO CLASS)	7	ELECTRIC BOAT
ATTACK SUBMARINE (LOS ANGELES CLASS)	18	ELECTRIC BOAT/ NEWPORT NEWS
PRE-POSITIONING SHIP (TAKX)	5*	GENERAL DYNAMICS
PRE-POSITIONING SHIP (TAKX CONV)	8*	BETH STEEL (SP) BETH STEEL BEAUMONT/ NATIONAL STEEL
HOSPITAL SHIP (T-AH CONV)	2	NATIONAL STEEL
CRANE SHIP (T-AC CONV)	1	BAY SHIPBUILDING
FAST LOGISTIC SHIP (T-AKRX CONV)	8	NATIONAL STEEL/ PENN SHIP/AVONDALE
BATTLESHIP (BB REACTVN)	1	INGALLS
TOTAL	115	

*Programs managed by Military Sealift Command

CHART 3

Chart 3 depicts the Navy ships under construction or being converted in the private sector as of 15 March 1984. These include 95 new construction, 19 conversion, and one reactivation. The only FY 34 appropriated ships not awarded at this time are the FFG and Mine Sweeper-Hunter (MSH).

NAVY NEW SHIP CONSTRUCTION DELIVERIES
15 MARCH 1984

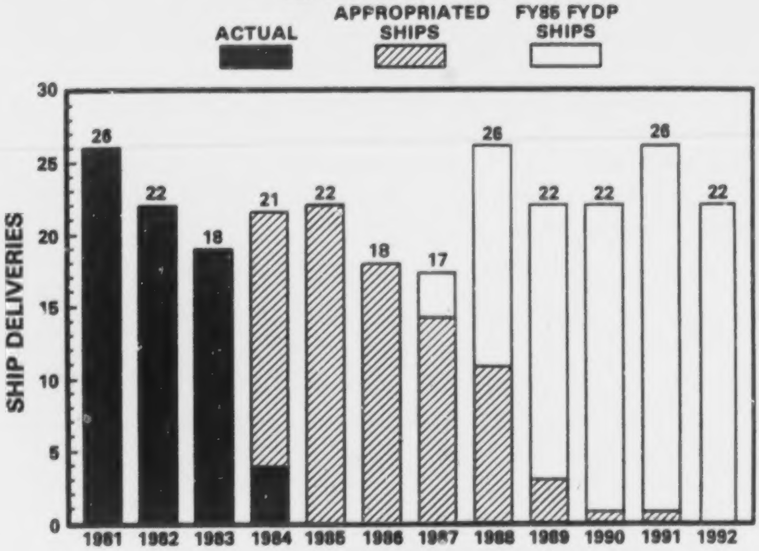


CHART 4

The Navy new construction and conversion program in general is doing well. The Navy's business relationships with the shipbuilders are better than they have been in years. There continues to be no new construction shipbuilding claims outstanding against the Navy. Delivery dates are current and costs are within budget. In 1983, 21 new construction or conversion ships were delivered, 8 early, 12 on time, and 1 late. In 1984, 27 ships are estimated to deliver, 15 on time, 8 early, and 4 late. Chart 4 shows the new construction ships only in graphic form and does not include the conversions and reactivations in the shipbuilding program.

Newport News Shipbuilding has made impressive progress on the aircraft carrier THEODORE ROOSEVELT (CVN 71). The ship is now estimated to deliver at least 14 months ahead of its contract delivery date.

Shipbuilding program cost performance in recent years has been good. Thirteen of the ships delivered in 1983 were on or under their original appropriated budget. The majority of ships delivering in 1984 are also expected to be within their original budget as are most of the ships we currently have under contract. The overall shipbuilding program is within budget. The FFG program at Bath Iron Works is an example of exceptional performance in this area. With early deliveries and under target cost performance, we have saved more than 100 million dollars on their first 15 follow ships of the Perry Class Guided Missile Frigates. These are real savings because the price of each of these ships was arrived at by competition among three good yards.

DELIVERY ASSESSMENT

15 MARCH 1984 VS 1 APRIL 1983

QTY	SHIP CLASS	EARLIER	LATER	NO CHANGE
3	AIRCRAFT CARRIER (CVN)	3		
12	GUIDED MISSILE CRUISER (AEGIS) (CG)	3		9
1	AMPHIBIOUS ASSAULT SHIP (LHD)			1
4	LANDING SHIP DOCK (LSD)			4
14	GUIDED MISSILE FRIGATE (FFG)	8	2	4
5	MINE COUNTERMEASURES (MCM)			5
4	FLEET OILER (T-AO)			4
1	CABLE REPAIR SHIP (T-ARC)		1*	
4	SALVAGE SHIP (ARS)		1	3
12	OCEAN SURVEILLANCE (T-AGOS)		12	
7	FLEET BALLISTIC MISSILE SUBMARINE (OHIO CLASS)			7
18	ATTACK SUBMARINE (LOS ANGELES CLASS)	6	4	8
85	TOTAL	20	20	45

*Delivered March 19, 1984

CHART 5

Chart 5 shows the Naval Sea Systems Command managed ships under construction in private yards and their current, Navy estimated delivery status as compared to the estimated delivery dates last April. A total of 20 ships are estimated to be delivered earlier, 20 are later, and 45 estimated ship delivery dates are unchanged from our projections of last year or are new ship awards. The reasons for the later estimates are summarized below:

- FFG — Approximately 2- to 3-month delay on 2 ships due to the strike at Todd Seattle.
- TARC — A 2-month delay due to shipbuilder problems encountered during sea trials.
- ARS — A 4-month delay due to the shipbuilder now estimating inability to complete the ship prior to the closing of the St. Lawrence Seaway for the winter. The ship will meet the contract delivery date of February 1985 vice the goal of October 1984.
- TAGOS — Twelve ships delayed principally due to a 17-week strike.
- SSN — About 3 months delay on three ships due to outfitting and testing problems. One additional ship will deliver 3 months later due to an extension of the contract period to install the Vertical Launching System (VLS).

CAPACITY AND CAPABILITY OF PRIVATE INDUSTRY

The Navy's proposed five-year ship construction program includes 121 new construction ships and 21 ships to be converted or reactivated in FY 85 through FY 89. The capacity and capability of the industry is adequate to execute the Navy's five year ship construction program. This budget request does not include a request for additional escalation funds for prior year programs. This is due to the low rates of inflation experienced during FY 83. This is also the first time since FY 81 that the Navy has not requested funds for cost growth in prior year's programs. This is due to better contractor performance, favorable contract awards as a result of competition, and an overall improvement in the management of the shipbuilding program.

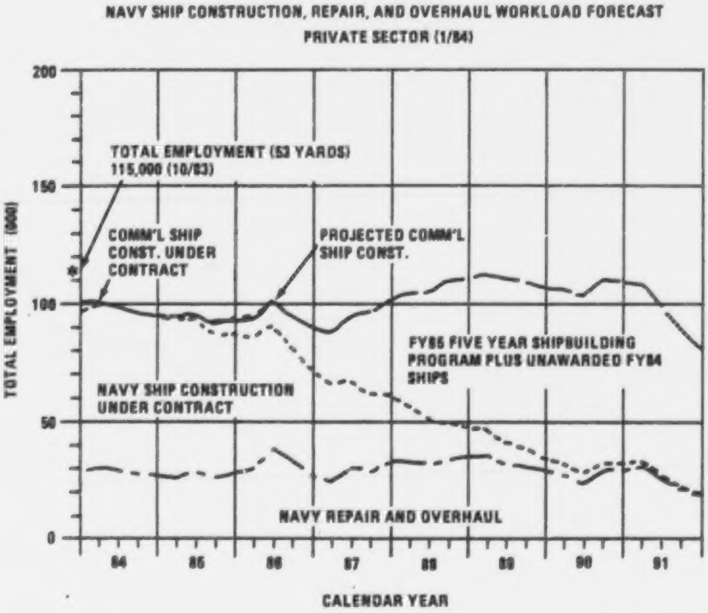


CHART 6

PROJECTED NAVY WORKLOAD FOR PRIVATE SHIPBUILDERS

For the past 3 years, I have forecast a declining shipbuilding industry. During FY 83, a total of 53 private shipyards performed work on Navy ship construction, repair, and overhaul. As of October 1983, the total employment in these 53 yards was 115,000. This represents about a 6,500 man reduction from October 1982. Of these 115,000 employees, 30,000 were applied to Navy ship repair and overhaul, 65,000 to Navy ship construction, 5,000 for commercial ship construction, with the balance of 15,000 being applied to commercial repair and other industrial or nonship work. Ten of these 53 shipyards were involved in only Navy ship construction, 35 in Navy ship overhaul and repair, and 8 in both Navy ship construction and overhaul and repair. Chart 6 depicts the Navy's forecast of employment in these 53 private sector shipyards resulting from current and projected commercial ship construction, Navy ship construction and Navy repair and overhaul. The projected ship construction work is derived from the Navy's FY 85 Five-Year Shipbuilding Program and MARAD estimates of commercial new construction. The Navy's portion of the private shipyard workload is projected to increase modestly to about 110,000 employees with the planned Navy shipbuilding and ship overhaul programs.

SUPPORTING INDUSTRY

Ship construction and repair includes the assembly or replacement of materials and components produced by a supporting industry that is spread all over the country. Therefore, there is a strong dependence on suppliers and subcontractors. The Navy monitors this supporting industry's performance. With the decrease in commercial work, the capacity required of the supporting industry to execute the Navy shipbuilding program is well within their demonstrated performance.

ARLEIGH BURKE GUIDED MISSLE DESTROYER

An important new surface combatant program in the President's Budget is the detail design and construction of the lead ship, ARLEIGH BURKE DDG 51. The Navy contract design will be completed in June of this year. The Navy plans to conduct a source selection and award the lead ship contract this calendar year. This contract design is well defined after examination of numerous alternatives and tradeoffs involving practically every part of the ship. Three shipbuilders have participated in the design to ensure producibility and help us hold costs to a minimum. I am confident about the technical aspects of this design.

Cost estimates for the lead and follow ships are based on a well defined design and good cost estimating relationships. CG 47 was delivered in 1982, within the original budget, excluding escalation subsequent to the appropriation year. The second cruiser, CG 48, is essentially complete now. Thirteen of these ships have been ordered. The DDG 51 combat system and machinery plant is a derivative of the CG 47. A component by component comparison indicates very little cost risk in that most items are currently under procurement for other ships and have known costs. Further, shipbuilder fabrication costs are based on experience from construction of DD 963 Class and DD 993 Class at Ingalls and FFG 7 at Bath and Todd. The Government Furnished Equipment estimates are again based directly on actual cost experience of the CGs, allowing for the differences in the two ships' characteristics. The estimated costs containing some uncertainty are a relatively small percentage of the total budget. We have had an excellent record on the CGs and I have every reason to believe that our estimates for the DDG 51 ships will prove to be just as accurate. I have a high level of confidence in DDG 51 cost estimates.

We plan to complete the lead ship design and construction on a fixed price cost incentive contract among several capable and knowledgeable shipyards who need the work. If normal market forces are not disturbed, I see no reason why this should not be a very successful ship acquisition. It has high potential for providing the Navy a very capable and affordable destroyer that can be built in series and periodically modified in construction to meet new needs or new opportunities.

PUBLIC SHIPYARDS

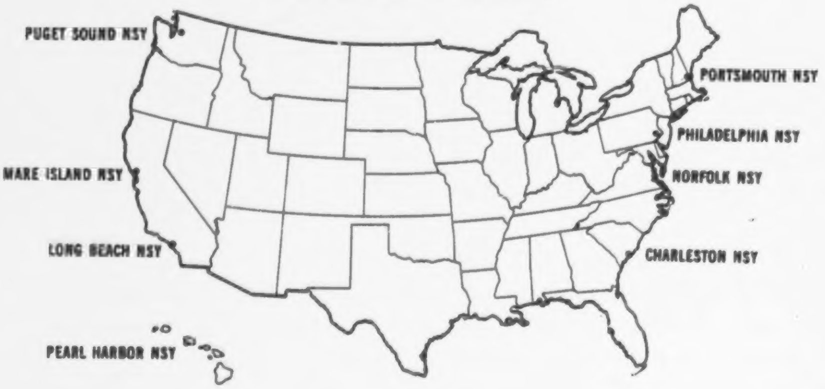


CHART 7

There are eight public shipyards as shown in Chart 7. Since 1967, no new ships have been built in the Naval Shipyards. Six of these eight yards are qualified for the overhaul of nuclear-powered ships. The combined employment level of the eight public yards is approximately 79,000 and is expected to reduce some in the coming years. This will result from the reduced number of ship overhauls in future years and our desire to retain the vitality of the private sector to support the Navy.

The Navy mission is to conduct prompt and sustained combat at sea. The Navy maintains readiness to fulfill that mission through almost continuous training, exercise, maintenance, modernization, and self-appraisal. To stay ready for prompt and sustained combat at sea, the Navy relies on maximum self-sufficiency within each ship. The tradition of the near final authority of a ship's Commanding Officer, the ability of the ship to sustain itself under adverse conditions and the ability to go into harm's way in any part of the world are fundamental main-stays of the Navy. It is the starting point for the Navy's three-level ship maintenance and modernization concept. All maintenance that can rationally be accomplished by the ship's crew is done that way. Additional required work is accomplished by sailors assigned to tenders and repair ships (which can be forward deployed) or small activities ashore, the "intermediate maintenance activities." Ship's maintenance and modernization work that is beyond that capability or capacity is accomplished by depot maintenance activities at regular, periodic overhaul periods.

The Navy's depot maintenance capability is an indispensable part of the fleet's readiness for war. It is made up of two components: the eight geographically dispersed Naval Shipyards and the several private sector shipyards that regularly perform Navy depot maintenance and modernization work. The Naval Shipyards are maintained at the minimum size and levels of employment necessary to accomplish the assigned portion of the Navy's annual peacetime depot maintenance and modernization workload on its complex and moderately complex ships. The ships assigned to the Naval Shipyards have the most complex combat and propulsion systems where the highest skills, strongest technical controls and experience are needed to guarantee quality and performance. Further, this ensures they efficiently exercise their skills and capabilities on needed peacetime work to maintain their readiness to accomplish planned mobilization work and battle damage repair. The remaining peacetime depot maintenance workload is accomplished by the private sector shipyards. In this way, the Navy's required readiness for war is efficiently maintained and the maximum amount of the Navy's ship depot maintenance work is provided to the private sector to maintain a viable ship repair industry for wartime mobilization.

OVERHAUL IMPROVEMENT EFFORTS

The depot maintenance has improved significantly this past year. For example, the total projected delay in completion of submarines in overhaul in Naval Shipyards has been reduced to zero while at the same time the overhaul durations have been substantially reduced. The approval for the Naval Shipyards to operate over the past year without an end of fiscal year personnel ceiling has been an important factor in improving the performance of the yards. This relief from the need to remove several thousand people from shipyard rolls near the end of the fiscal year and then rehire them again after the new year, along with other improvements in operations, has resulted in reduced total full time permanent employment in the Naval Shipyards. If relief from end of fiscal year ceiling control is continued, it is expected that full time permanent employment will continue to shrink somewhat as the Naval Shipyards continue to improve their efficiency and productivity while maintaining their required readiness for war.

Over the past year, an extensive number of coordinated actions have been taken to improve Naval Shipyard performance. Many of the actions were aimed at changing attitudes, improving adherence to prescribed procedures, and better interactivity coordination. A performance audit and feedback method has been established. A team of about two dozen of the best Naval Shipyard professionals was selected and trained in the art of auditing. This approach to coordinated improvement of Naval Shipyard performance has been successful in stimulating increased efficiency and productivity. In the private sector, flexibility in contract form has been used to stimulate improvement. The Supervisors of Shipbuilding, Conversion and Repair Offices have been better staffed to ensured more complete over-sight. The Navy's dedication to improving performance in the maintenance and modernization of our ships is strong and effective. All performance trends are in the right direction. Better performance, high quality, cost reduction, and schedule adherence are day-to-day issues with all our senior managers receiving continuous detailed attention.

SUMMARY

I am pleased to report that the status of the Navy's current shipbuilding programs is generally good. We can execute the President's five-year shipbuilding program if that plan is authorized and funded by the Congress. The performance of both the public and private sector in the overhaul, modernization, and maintenance of our ships and weapons is satisfactory and improving. The support of the Congress and this Committee in particular have helped to make this possible.

Senator COHEN. I would like to move on as quickly as we can. Admiral Schoultz?

STATEMENT OF VICE ADM. ROBERT F. SCHOULTZ, DEPUTY CHIEF OF NAVAL OPERATIONS (AIR WARFARE)

Admiral SCHOULTZ. Thank you, Mr. Chairman.

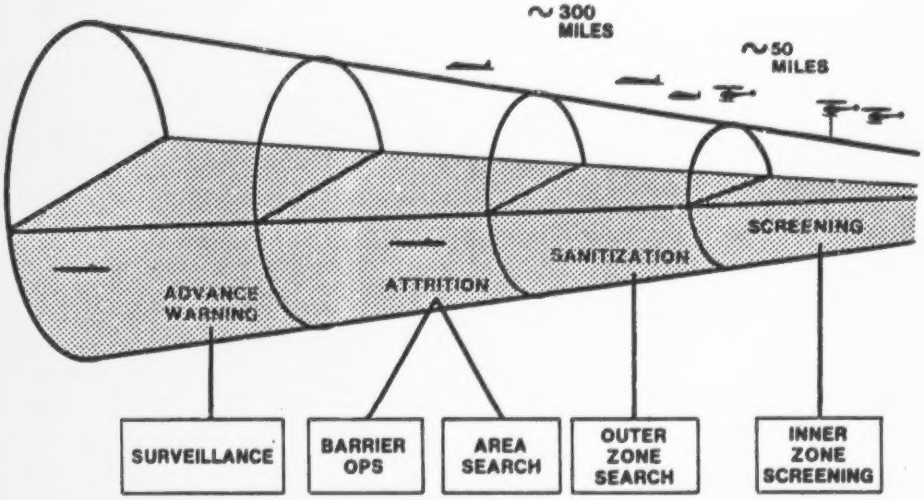
As requested by you and your staff, I will be very brief.

I will be talking to you today about ASW aircraft and mine countermeasures aircraft.

I don't need to remind this committee of the Soviet threat to our homeland from their submarines, to our sea lines of communications, and in particular to our sea going forces. They have some 250 attack submarines, while we have roughly 100. They are building about one a month, while we are building about four a year.

As you know, the Germans had only 57 submarines at the beginning of World War II, and they did tremendous damage to the allies. The Soviet submarines that are being built can dive deeper, are faster, are tougher, and have tremendous offensive capability.

ASW LAYERED OFFENSE CONCEPT



We use a concept of layered offense in ASW. With sensors and long range aircraft, we attempt to locate enemy submarines in the outer area. We track and prosecute them with carrier aircraft as they close to the middle area, through the outer zone, then the inner zone. We use a screening process and employ point defense at the battle group. This layered offense is shown on the screen.

The outer zone is taken care of by the P-3 Orion, which we use to track and destroy the various submarines that we find.

The P-3's have a combat radius of about 1,300 nautical miles if they stay low, and about 10 hours endurance. If they monitor buoy patterns for altitude, they can go out 1,600 miles and stay airborne for 14 hours.

They carry four torpedoes and four depth bombs.

We have had an evolutionary sensor development in these airplanes. We are now in the Update III—we have gone through Updates I and II—to sensor improvement. An advanced signal processor, the Proteus system, is installed in this aircraft.

The carriers have their own organic ASW capability. They have the S-3A Viking, which is used for the forward ASW screen, for local and area search. It is an all-weather, day/night, search aircraft against surface and subsurface targets. It provides rapid reaction because it is jet propelled.

The new weapons improvement program in the S-3 is called the S-3B WSIP. It is designed to counter the threat of the 1990's. It provides state-of-the-art technology for increased range of detection and classification. It will have an inverse synthetic aperture radar, improved reliability and maintainability, and Harpoon capability.

Also, aboard the carriers, and the other ships in the battle force, we have two types of LAMPS Helos, the Light Airborne Multi

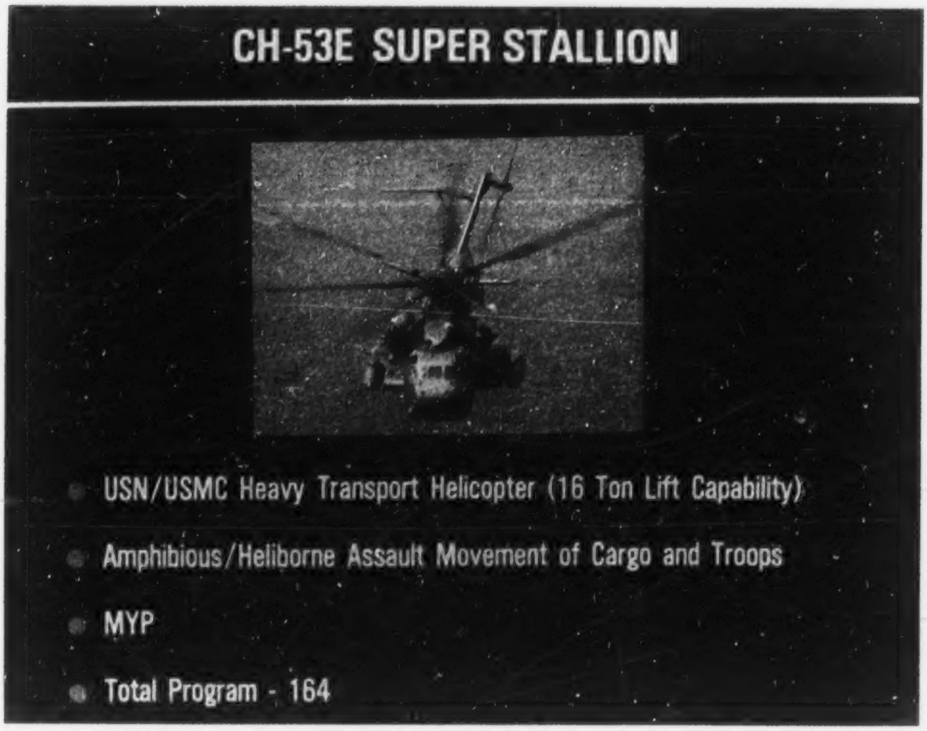
Purpose System. LAMPS I uses the SH-2F Helo—we have about 85 of these aircraft in the inventory. Then we have the LAMPS MK III, the SH-60B. The LAMPS I, which has active and passive sonobuoy capability, relays acoustic date to the parent ship for processing. It carries one torpedo, has a shorter range, and shorter endurance. The SH-60B is an airborne subsystem of the whole LAMPS III system. It is employed on the FFG-7, the DD-963, and the CG-47 class ships.

The LAMPS III system includes the Helo, the ship's electronics, the Helo landing system, and the Helo support facilities.

This greatly increases the capability of our surface combatants, improving their flexibility, range, and effectiveness. The SH-60B can process sonobuoy information with the ship through a data link. It also has a full onboard capability to process that same information. It can carry two ASW homing torpedoes.

For the inner zone, or point defense from the carrier, we use the SH-3 with dipping sonar. Our current dipper has a 500-foot cable. It is the final layer of offense. It has an active sonar transducer to combat the noise in the area of the battlegroup. There is competition for replacement of this aircraft. It is called the CV inner-zone Helo, and we expect that a contract will be let by the first of the year.

This is our layered offense in ASW. We feel that all the components critical, not only to defense, but to offense. One is not more or less critical than another. None can be eliminated. We have to ensure that we stay capable of countering the threat.



CH-53E SUPER STALLION

- USN/USMC Heavy Transport Helicopter (16 Ton Lift Capability)
- Amphibious/Heliborne Assault Movement of Cargo and Troops
- MYP
- Total Program - 164

You asked us to talk about mine countermeasures. We have an airborne mine countermeasures Helo, called the MH-53 which is the newest version of the CH-53E and is specifically designed for the mine countermeasures mission.

Our estimates of the Soviet mine inventory, and "Jane's," are fairly close. They have about 400,000 mines, for which they have many, many uses. They can prevent or delay resupply of our ground forces, deter amphibious assault, block choke points, hazard fleet operations, and close ports. Our only current air mine countermeasures aircraft is our RH-53D, which is limited in what it can do.

We are requesting two MH-53E's in 1985, which will increase our capability, using the new ALQ-166 magnetic mine sweeping sled. The RH-53D cannot tow that sled today.

The MH-53E will have one-third more on-station time. It will be able to operate day and night, and has precise navigation equipment so that the crew will know exactly where they are, a requirement for effective mine-sweeping. It will be more reliable and more maintainable. And it has human engineering improvements in it to cut down on crew fatigue.

This is a multiyear procurement program, and we expect to save $130 million in the course of the program. We have a high degree of cost confidence based on 7 years procurement of this aircraft, a validated requirement, stable funding, and a stable configuration.

In naval aviation, we intend to continue to provide a balanced program to meet the threat, both from submarines and from mines.

That completes my statement, Mr. Chairman.

[The prepared statement of Admiral Schoultz follows:]

PREPARED STATEMENT OF VICE ADM. ROBERT F. SCHOULTZ, DEPUTY CHIEF OF NAVAL OPERATIONS (AIR WARFARE)

Mr. Chairman and distinguished Members of Congress: I am honored to be here today to discuss the fiscal year 1985 Navy Aircraft Procurement Program for Anti-Submarine Warfare (ASW) and Mine Counter-Measures (MCM) Aircraft.

I believe it is more important than ever that the vitality of the entire Navy-Marine Corps aviation team be maintained. National commitments require that our forces be deployed to protect U.S. interests around the world in peacetime and be prepared to respond at any level in conflict. The ability of Navy-Marine Corps aviation to respond with action in crisis situations and by mere presence has been amply demonstrated in Central America, Grenada, and Lebanon over the past year.

Our budget request for Fiscal Year 1985 is designed to strengthen air warfare capabilities in the Department of the Navy and represents a considered balance of competing priorities. The requested procurements do not meet every requirement but I am convinced that our budget request will achieve the highest level of effectiveness within the constraints of fiscal reality.

We have allocated Naval Aviation's resources to the four central elements of force effectiveness: Readiness, Sustainability, Modernization and Force Levels. These factors must interact to achieve the greatest advantage for Naval Aviation. Over the past several years we have made significant improvements in each of these four categories and plan to continue that trend in the future.

In the area of readiness, our overall goal is to achieve a force level Aircraft Mission Capable (MC) rate of 70 percent. Our readiness trends are moving positively in that direction. We averaged 66.5 percent MC in fiscal year 1983 and forecast 67 percent in fiscal year 1984. With continued Congressional support for our repairable and spare parts requests we should achieve our 70% MC goal in fiscal year 1985.

The prime elements of material readiness are aviation spares and aircraft depot rework. The fiscal year 1985 budget shows a decrease in spares and component rework funding from the fiscal year 1984 level. This is because procurement and repair lead time responsibility for these accounts has been transferred to the Navy Stock Fund in fiscal year 1985. Stock funding of Aviation Depot Level Repairables will improve both readiness and sustainability. Readiness increases are also anticipated due to the recently adopted Aircraft Service Period Adjustment (ASPA) program which will base our airframe rework requirements on the specific material condition of each aircraft as opposed to the average condition of all of that type aircraft. Also contributing to readiness improvement is the Navy's increased investment in aircraft support equipment, which becomes more vital as we build toward 15 deployable carriers and the requisite air wings which will operate from them. Specifically our fiscal year 1985 request includes the aircraft support equipment required for USS THEODORE ROOSEVELT (CVN-71), which will be delivered in fiscal year 1987.

Sustaining our carriers in global operations is an important part of the effectiveness equation. As Secretary Lehman pointed out in his posture statement the formula for sustaining day-to-day operations is based on identifying those commodities which are "war stoppers." Shortages for sustained operations have been identified and we are taking positive steps to address those stockpile, parts and support deficiencies. Over the past three years investments in spare parts, weapons, aircraft maintenance, and support equipment have increased substantially. Eight of our thirteen carriers can be deployed today fully equipped and capable of sustained operations. The funding requested in the fiscal year 1985 budget for these high priority requirements is necessary to achieve our sustainability objectives and fully outfit our fifteen carriers as they are delivered. To fill out the battle groups which will steam with those carriers, providing a significant portion of the carrier's ASW protection, we plan to retain some older surface combatants in the active fleet longer than originally envisioned.

Two types of LAMPS Helicopters are employed on our surface ships, to maximize their ASW capability. For those combatants which cannot handle the new SH-60B(LAMPS MK III) we must continue to provide the SH-2F(LAMPS MK I). The LAMPS MK I carries both active and passive sonobuoys and processes acoustic data through a relay with its parent ship.

The SH-60B Seahawk is the air sub-system of the LAMPS MK III system scheduled for FFG-7, DD-963 and CG-47 class ships. The total MK III system includes the SH-60B, the ship's electronics, a helicopter landing system, and helicopter support facilities. LAMPS III is a computer-integrated, ship/helicopter combat system that greatly increases the flexibility, combat range and effectiveness of surface combatants. The SH-60B passes sonobuoy information through an advanced data link to the LAMPS MK III ship for processing. It also has full onboard processing capability. Both LAMPS MK I and MK III can attack using ASW homing torpedoes. LAMPS ships and aircraft are needed to escort our convoys through sub-infested waters. We have requested $70 million if ~~FY~~19-85 for the SH-2F which includes $65.9 million for procurement of 6 aircraft and $4.1 million for initial spares. The recurring flyaway cost of the SH-2F is $9.7 million. Additionally, we have requested $481.3 million in ~~FY~~19-85 for the SH-60B, which includes $385.6 million for procurement of 18 aircraft and $95.7 million for initial spares. The recurring flyaway cost of the SH-60B is $15.2 million.

We are reevaluating our carrier inner-zone ASW helicopter program, to replace the aging SH-3H aircraft, by conducting a competitive development effort. The primary objective of the competition will be to obtain the CV inner-zone helo with the lowest development, acquisition and support costs consistent with the operational requirement.

The P-3C ORION, our shore-based, long range ASW aircraft, has been in production since 1969 and has enjoyed an evolutionary development of its sensor systems through the Update program. The latest improvement is Update III which adds the Proteus advanced signal processor, significantly improving the ORION's ability to detect, track, and attack quieter, new generation Soviet subs. The first Update III P-3C aircraft will enter fleet service in May of this year. We have 24 active P-3 squadrons, 19 of which operate the P-3C and 5 of which fly the P-3B. There are also 13 Reserve squadrons, which fly P-3As and P-3Bs.

We have requested $483.3 million in ~~FY~~19-85 which includes $465 million for procurement of 9 aircraft and $18.3 million for initial spares. The recurring flyaway cost of the P-3C is $38.1 million.

The S-3A VIKING, our fixed wing, carrier-based ASW aircraft, is no longer in production but a major modernization effort will commence in ~~FY~~19-85. The Weapon System Improvement Program, or WSIP, will retrofit avionics and weapon subsystems to counter the ASW threat of the 1990s. The resultant S-3B will incorporate state-of-the-art technology for increased radar detection range and classification, multiple vernier acoustic processing, increased electronic support measures (ESM) capability, and integration with the HARPOON missile.

Another warfare area in which we must continue to expand our capability, and one which is of specific interest to this sub-committee, is mine countermeasures. As you know, the Soviet and Warsaw Pact nations have the world's largest stockpile of mines. These mines could be used in a variety of ways: to prevent or delay the re-supply of ground forces; to deter amphibious assaults; to block narrow waterways (choke-points); to hazard fleet operating areas; or to close our ports. Our only existing airborne MCM platform is the RH-53D. Our current budget request includes funding for 2 MH-53Es which will be much more MCM capable than the RH-53D, and which enjoy significant growth potential to accomodate developing MCM technology. The MH-53E's greatly increased tow capacity will enable it to tow the ALQ-166 magnetic minesweeping device, which exceeds the tow capacity of the RH-53D. Additionally, it will provide an approximately one-third increase in on-station time, and an all-weather airborne MCM capability not available in the RH-53D. It will be much more reliable and maintainable, and enjoys improved human engineering to reduce crew fatigue.

The fiscal year 1985 budget requests approval of the CH/MH-53E for multi-year procurement. In addition to providing significant savings the program meets the following multi-year procurement criteria: a high degree of cost confidence based on seven prior years of CH-53E procurements, a validated requirement, stable funding, and a stable configuration. Multi-year procurement savings of $130 million will be realized when compared to annual procurement of the CH/MH-53E.

The $320.5 million requested in ~~FY~~19-85 includes $292.9 million for the procurement of 10 aircraft, 8 CH and 2 MH-53Es, and $27.6 million for procurement of initial spares. The recurring flyaway unit cost of the CH/MH-53E is $15.8 million.

As we build force levels toward the 600 ship Navy and the necessary aviation assets to support that growth we must carefully balance our procurement program. It is well documented that we are not acquiring aircraft in sufficient quantities to attain our force structure goals without increasing the age of our force. Affordability is the crucial issue and substantial progress has been made in aircraft procurement cost reductions. Program cost growth has been reversed and we will continue to stress cost reduction in future contractual agreements.

The goal of Naval-Marine Corps Aviation is to build a credible force and employ tactics and strategies which enable us to fight intelligently and win in any arena, including anti-submarine warfare and mine counter-measures. That includes not only ensuring a strong, capable air arm, but a functional and practiced interoperability with our sister services, providing ever increasing capabilities in combined arms efforts. With your continued support, we shall ensure our ability to attain and sustain that goal.

Senator Cohen. Thank you very much, Admiral Schoultz.

Admiral Thunman, we would be pleased to hear from you.

STATEMENT OF VICE ADM. NILS R. THUNMAN, U.S. NAVY, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SUBMARINE WARFARE

Admiral Thunman. Thank you, Mr. Chairman.

I would like to submit my statement for the record. I also would like to provide you the written answers to the questions of Senator Hart that we were not able to cover fully during our hearing last week.

I will briefly discuss three major areas of attack submarine procurement: The 688 class new construction program, modernization of our current SSN force, and tactical weapons.

First, I will discuss the 688 class new construction program.

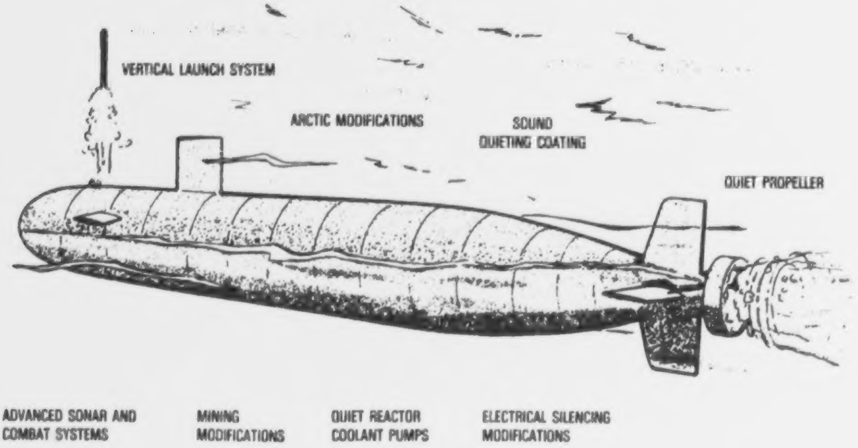
The improved 688 class new construction program is our principal counter to the increasingly capable Soviet attack submarines which are entering their fleet today. These new 688's are vital to the execution of our maritime strategy, which calls for the majority of our attack submarines to go forward at the beginning of armed conflict, deep into Soviet waters, to sink their fleet, bottle up their massive submarine force, and now, with the advent of the Tomahawk cruise missile, threaten land bases.

In view of the improving Soviet submarine quality, with no reduction in their 3 to 1 numerical superiority, we cannot afford to relax our efforts to reach our goal of 100 nuclear attack submarines by 1990.

The four 688's we are requesting in fiscal year 1985 are needed to meet this goal. These ships will have twice the capability of older ships of the 688 class. The reason that these particular ships are so important is that, for the first time, all of the major improvements to the 688's will be included in one platform.

In this chart the improvements are shown.

THE 688 CLASS IMPROVEMENT PLAN


VERTICAL LAUNCH SYSTEM
ARCTIC MODIFICATIONS
SOUND QUIETING COATING
QUIET PROPELLER
ADVANCED SONAR AND COMBAT SYSTEMS
MINING MODIFICATIONS
QUIET REACTOR COOLANT PUMPS
ELECTRICAL SILENCING MODIFICATIONS

These will be the first of the 688 class to receive major quieting enhancements, such as hull coatings, a quieted propeller, and quieted electrical systems and reactor coolant pumps. They will be modified to make them fully capable of operating under the Arctic icepack. Only five of the previously authorized 688's have this full Arctic capability.

They will have a significantly more capable combat system installed, commonly called SUBACS, or the advanced submarine combat system. It is very important that the development and procurement of this system proceed on schedule so that we can support not only these new authorizations, but the five previously authorized 688's which are scheduled to receive this system.

Finally, they will have a vertical launch system to increase their firepower. Only 13 of the previously authorized 688's have the VLS system.

These submarines will significantly enrich the overall effectiveness of our force. We urgently need them to counter the new Soviet submarine designs, such as the *Victor III,* the *Typhoon,* the *Oscar,* the *Sierra,* and the *Mike,* which have entered their fleet during the past 3 years.

Now let me turn to force modernization.

Our plan to upgrade the current SSN force with new combat system equipment also is vital to meet the threat.

The thrust of this program is to improve our submarine sonars and give our ships the capability to employ advanced submarine weapons.

The sonar system will be improved through the installation of the AN/BQQ-5C sonar system and an improved towed array in our 637 and 688 class submarines while in overhaul.

This sonar system upgrade will provide our submarines with an expanded search capability, advanced signal processing, and better tactical display of sonar information.

We will also install an improved combat system, referred to as the CCS MK I system, in overhauling 637 and 688 class ships. This system will give the ships the capability to employ the Tomahawk, the MK-48 advanced capability torpedo, or ADCAP, as we call it, the submarine launched mobile mine, and the antisubmarine warfare standoff weapon. All of these are new weapons scheduled to enter the fleet in the next 5 years or so.

Finally, let me say just a few words on our tactical weapons procurement plan.

We are requesting 144 MK-48 MOD 4 torpedoes and 23 of the ADCAP conversion kits in our fiscal year 1985 budget. These are our primary submarine weapons, designed to destroy the highly capable surface and submarine targets that we see in the Soviet fleet.

We are asking for 25 Harpoon missiles. This is our current fleet antiship cruise missile. We are also asking for 90 Tomahawk cruise missiles for submarine use.

Last fall, we achieved full operational capability for the Tomahawk antiship missile, and we anticipate fleet introduction of the land-attack version this summer.

In summary, our plan has been carefully structured to counter the increasingly capable Soviet Navy through construction of the improved 688 class, modernization of our current force, and development of effective weapons. We request your strong support, sir.

[The prepared statement of Admiral Thunman follows:]

PREPARED STATEMENT OF VICE ADM. N. R. THUNMAN, U.S. NAVY, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SUBMARINE WARFARE

INTRODUCTION

THE U.S. SUBMARINE FORCE PLAYS A VITAL ROLE IN OUR MARITIME STRATEGY.

STRATEGIC SUBMARINES PROVIDE THE NATION WITH A HIGHLY MOBILE, UNDETECTABLE SECURITY SYSTEM -- A SURVIVABLE AND SOLID LEG OF OUR NATIONAL STRATEGIC TRIAD. ITS DETERRENT CREDIBILITY IS CLEARLY RECOGNIZED.

ATTACK SUBMARINES ARE CENTRAL TO EFFECTIVE EXECUTION OF OUR FORWARD NAVAL STRATEGY. THIS WAS CLEARLY STATED BY THE SECRETARY OF THE NAVY WHEN HE RECENTLY WROTE: "PARTICULARLY IN SUBMARINE WARFARE, UNLESS A FORWARD STRATEGY IS EMPLOYED AT ONCE TO FORCE THE USE OF SOVIET SUBMARINES TO PROTECT THEIR STRATEGIC MISSILE FORCES AND THE APPROACHES TO THEIR HOME WATERS, SOVIET SUPERIORITY IN NUMBERS COULD WELL DETERMINE THE OUTCOME OF THE WAR." OUR ATTACK SUBMARINE FORCE IS CAPABLE OF FIGHTING AND WINNING AGAINST TODAY'S THREAT. BUT OUR QUALITATIVE EDGE IS ERODING AND WE FACE A SERIOUS CHALLENGE TO THE UNDERSEA SUPERIORITY WE HAVE ENJOYED FOR THE PAST THREE DECADES.

THE FY 1985 BUDGET SUBMISSION HAS BEEN DEVELOPED TO MAINTAIN A HIGH STATE OF READINESS AGAINST TODAY'S THREAT AS WELL AS TO PROVIDE A COUNTER TO WHAT IS PROJECTED IN THE FUTURE. WE HAVE ATTEMPTED TO CREATE A GOOD BALANCE IN ALL AREAS INCLUDING STRATEGIC, ATTACK SUBMARINES, DEEP SUBMERGENCE VEHICLES AND PERSONNEL. THE FOLLOWING ADDRESSES EACH AREA IN DETAIL.

STRATEGIC SUBMARINE PROGRAM

DETERRENCE OF WAR HAS BEEN THE SOLE MISSION OF OUR FLEET BALLISTIC MISSILE SUBMARINE FORCE. ADMIRAL WATKINS, THE CHIEF OF NAVAL OPERATIONS, HAS STATED THAT "THIS IS OUR NAVY'S HIGHEST PRIORITY PROGRAM AND A CORNERSTONE OF OUR NATIONAL SECURITY POLICY." FLEET BALLISTIC MISSILE SUBMARINES FROM USS GEORGE WASHINGTON IN 1960 TO USS MICHIGAN IN 1983 HAVE SUCCESSFULLY COMPLETED OVER 2200 STRATEGIC DETERRENT PATROLS DIRECTLY IN SUPPORT OF THE NATIONAL SECURITY OBJECTIVES. THE TRIDENT PROGRAM, WITH MODERN SUBMARINES AND A NEW GENERATION OF STRATEGIC MISSILES, WILL ENSURE THAT THE STRATEGIC SUBMARINE FORCE CONTINUES TO FULFILL ITS VITAL DETERRENT ROLE WELL INTO THE NEXT CENTURY.

OUR PROGRAM TO MODERNIZE OUR STRATEGIC SUBMARINE FORCE WITH THE NEW TRIDENT SUBMARINES IS ON TRACK AS THESE IMPRESSIVE, NEW SHIPS ARE DELIVERED TO THE NAVY. WE NOW HAVE FOUR TRIDENT SUBMARINES IN THE FLEET. THEY ARE THE MOST EFFECTIVE WARSHIPS OF THEIR KIND IN THE WORLD TODAY -- QUIETER, FASTER, AND WITH MORE FIREPOWER THAN THE AGING SSBNs THEY WILL REPLACE. THE FIRST TWO TRIDENTS, USS OHIO AND USS MICHIGAN, HAVE TOGETHER CONDUCTED EIGHT DETERRENT PATROLS. USS FLORIDA IS INPORT AT THE TRIDENT SUBMARINE BASE AT BANGOR, WASHINGTON PREPARING TO DEPLOY ON HER FIRST PATROL THIS SPRING. THE FOURTH TRIDENT, USS GEORGIA, WAS COMMISSIONED 11 FEBRUARY 1984 AND WILL ARRIVE AT BANGOR LATER THIS YEAR. THESE FOUR SHIPS HAVE BEEN DELIVERED ON

OR AHEAD OF THE SCHEDULE AGREED TO BY THE NAVY AND THE SHIPBUILDER IN AUGUST 1981, AND PROGRESS ON THE OTHER SEVEN SHIPS UNDER CONSTRUCTION APPEARS SATISFACTORY TO SUPPORT THE DELIVERY SCHEDULE. THE FY85 BUDGET REQUESTS AUTHORIZATION FOR THE TWELFTH TRIDENT AND ADVANCE PROCUREMENT FOR THE THIRTEENTH AND FOURTEENTH SHIPS. OUR PLANS CALL FOR THE PROCUREMENT OF ONE TRIDENT PER YEAR. THE ULTIMATE NUMBER OF TRIDENTs TO BE BUILT IS NOT YET DETERMINED.

IN ADDITION TO THE FOUR TRIDENT SUBMARINES, WE PRESENTLY HAVE THIRTY-ONE OLDER SSBNs BUILT DURING THE 1960s. NINETEEN ARE EQUIPPED WITH THE POSEIDON (C-3) MISSILE, AND TWELVE ARE EQUIPPED WITH THE TRIDENT I (C-4) MISSILE. THE LONGER RANGE TRIDENT I MISSILE SIGNIFICANTLY INCREASES THE PATROL AREA AVAILABLE TO THE SUBMARINES AND ALLOWS TARGET COVERAGE SOON AFTER LEAVING U.S. PORTS. THESE THIRTY-ONE SSBNs WILL CONTINUE TO PROVIDE THE BULK OF OUR SEA-BASED DETERRENT FORCE UNTIL THEY REACH THE END OF THEIR USEFUL LIVES IN THE 1990s IF NOT RETIRED EARLIER TO COMPLY WITH ARMS CONTROL AGREEMENTS.

WE ARE REQUESTING MODEST FUNDING IN FISCAL YEAR 1985 TO MODERNIZE OUR STRATEGIC SUBMARINES. THESE MODERNIZATION EFFORTS INCLUDE IMPROVED STRATEGIC COMMUNICATIONS TO ENSURE CONNECTIVITY WITH THE NATIONAL COMMAND AUTHORITY UNDER CONDITIONS OF ATTACK AND NOISE QUIETING MODIFICATIONS TO MAINTAIN OUR ACOUSTIC ADVANTAGE. THE MODERNIZATION PROGRAM IS A NECESSITY IF WE ARE TO

CONTINUE TO MAINTAIN THE ESSENTIAL CONNECTIVITY AND THE SURVIVABILITY OF OUR STRATEGIC SUBMARINES.

OVER THE PAST SEVERAL YEARS THERE HAS BEEN A SHIFT IN NATIONAL STRATEGIC POLICY TO ADOPT A READINESS POSTURE TO DENY SOVIET WAR AIMS SHOULD DETERRENCE FAIL. THIS POLICY REQUIRES THAT THE SEA-BASED LEG OF THE TRIAD BE CAPABLE OF ATTACKING ACROSS THE FULL SPECTRUM OF POTENTIAL TARGETS, INCLUDING "HARDENED" OR REINFORCED TARGETS. IT IS PARTICULARLY IMPORTANT THAT THE SEA-BASED LEG OF THE TRIAD BE UPGRADED TO ENSURE THAT THE MOST SURVIVABLE COMPONENT OF OUR NATION'S DETERRENT FORCES IS EFFECTIVE AGAINST THE FULL RANGE OF TARGETS. TO ACHIEVE THIS IMPORTANT CAPABILITY, THE SECRETARY OF DEFENSE DIRECTED THE NAVY IN OCTOBER 1981 TO DEVELOP A NEW SUBMARINE LAUNCHED BALLISTIC MISSILE WITH IMPROVED ACCURACY AND GREATER RANGE/PAYLOAD CAPABILITY. THIS NEW MISSILE, DESIGNATED THE TRIDENT II (D-5), IS NOW IN THE ENGINEERING DEVELOPMENT PHASE. WE ARE PROCEEDING VERY WELL WITH THE TRIDENT II MISSILE PROGRAM WITH MISSILE DEPLOYMENT SCHEDULED FOR DECEMBER 1989. WE ARE CONFIDENT THAT THE DEMANDING ACCURACY AND PERFORMANCE GOALS CAN BE ACHIEVED.

EVENTUALLY, ALL TRIDENT SUBMARINES WILL BE CONFIGURED TO CARRY THE TRIDENT II MISSILE. BEGINNING WITH THE NINTH TRIDENT SHIP, ALL NEW CONSTRUCTION SHIPS WILL BE EQUIPPED WITH THE TRIDENT II MISSILE AS THEY ARE BUILT IN THE SHIPYARD. THE FIRST EIGHT TRIDENTS WILL RECEIVE THE TRIDENT II WEAPON SYSTEM DURING THEIR FIRST OVERHAUL BEGINNING IN THE EARLY 1990s.

WE ARE REQUESTING TRIDENT II MISSILE WEAPONS PROCUREMENT FUNDS IN FISCAL YEAR 1985 FOR PRODUCTION PLANNING, INITIAL OUTFITTING TOOLS AND TEST EQUIPMENT FOR THE PRODUCTION PLANTS, AND LONG LEAD TIME ADVANCE PROCUREMENT FOR MISSILES, GUIDANCE SYSTEMS, AND REENTRY SYSTEMS. THESE FUNDS ARE ESSENTIAL TO MAINTAIN THE DEMANDING SCHEDULE LEADING TO INITIAL MISSILE PRODUCTION AND A 1989 WEAPON SYSTEM INITIAL OPERATING CAPABILITY.

FLEET BALLISTIC MISSILE SUBMARINES ARE BASED AT HOLY LOCH, SCOTLAND; CHARLESTON, SOUTH CAROLINA; AND KINGS BAY, GEORGIA IN THE ATLANTIC AND BANGOR, WASHINGTON IN THE PACIFIC. STRATEGIC SUBMARINE LOGISTICAL SYSTEMS ARE DESIGNED TO MAXIMIZE THE PERIODS THESE SUBMARINES SPEND AT-SEA. AFTER MORE THAN 23 YEARS OF OPERATING SSBNs, THE IMPORTANCE OF THE LOGISTICAL SUPPORT SYSTEM IS INCREASING WITH THE EXTENDED OVERHAUL CYCLES AND SHORTER REFIT TIMES PLANNED FOR OUR NEW SUBMARINES.

THE SUBMARINE BASE AT BANGOR IS PROVIDING TRAINING, MAINTENANCE, AND WEAPON SYSTEM SUPPORT TO USS OHIO AND USS MICHIGAN. IMPROVEMENTS IN THE LOGISTICAL SUPPORT SYSTEM HAVE REDUCED THE REFIT TIME FROM 30 DAYS TO 25 DAYS FOR OUR OHIO-CLASS SHIPS ALLOWING THEM TO SPEND ABOUT 66 PERCENT OF THEIR LIFE CYCLE AT-SEA ON PATROL. THE INITIAL MISSILE LOADOUTS AND POST PATROL REFITS OF THE TRIDENT SUBMARINES HAVE BEEN EXECUTED WITH TEXTBOOK PRECISION.

KINGS BAY, GEORGIA, ALREADY THE HOME OF A POSEIDON SUBMARINE SQUADRON, WILL BE THE HOME OF THE FIRST TRIDENT II CAPABLE TRIDENT SUBMARINES. WE ARE REQUESTING FUNDS IN FISCAL YEAR 1985 FOR CONSTRUCTION OF THE TRIDENT FACILITIES NECESSARY TO SUPPORT THE SUBMARINES, WEAPON SYSTEMS, AND CREWS. FISCAL YEARS 1985 THROUGH 1987 ARE THE PEAK FUNDING YEARS IN THE DEVELOPMENT OF THE NEW TRIDENT BASE AT KINGS BAY, AND THE BUILDING SCHEDULE IS TIGHT. THERE IS NO MARGIN FOR DELAY IN THE BUILDING SCHEDULE IF WE ARE TO SUPPORT THE NEW TRIDENT II MISSILE SYSTEM AND THE INITIAL OPERATING CAPABILITY IN 1989.

STRATEGIC SUBMARINES POSSESS INHERENT AND UNIQUE SURVIVABILITY BECAUSE OF THEIR SUBMERGED OPERATION IN THE VAST AREAS AVAILABLE IN THE WORLD'S OCEANS. MAINTAINING THEIR SECURITY IN THE FACE OF EVER IMPROVING TECHNOLOGY IS EXTREMELY IMPORTANT TO OUR STRATEGIC POSTURE AND NATIONAL DEFENSE. WE HAVE AN EXTENSIVE SECURITY PROGRAM TO CONTINUOUSLY EVALUATE REAL AND POSTULATED THREATS THAT COULD AFFECT THE FUTURE SURVIVABILITY OF THE U.S. SSBN FORCE AND TO DEVELOP COUNTERMEASURES FOR POTENTIAL ANTISUBMARINE WARFARE (ASW) THREATS. HIGH LEVEL REVIEWS BY INTELLIGENCE AND TECHNOLOGY PANELS CONSISTENTLY AFFIRM THE SURVIVABILITY OF OUR SSBN FORCE, AND THE ADEQUACY OF OUR COUNTERMEASURES PROGRAMS TO MAINTAIN THIS INVULNERABILITY AGAINST POTENTIAL THREATS. NOTHING IS KNOWN WHICH WILL GIVE CREDENCE TO

ANY ASSUMPTION THAT SSBNs AT SEA COULD BE LOCALIZED AND DESTROYED. OUR SSBN SECURITY PROGRAM REQUIRES YOUR STRONGEST SUPPORT.

ATTACK SUBMARINE PROGRAM

JUST AS WE ENJOY UNDERSEA SUPERIORITY IN THE CONTEXT OF OUR STRATEGIC SUBMARINE FORCE, A PARALLEL SITUATION EXISTS IN OUR ATTACK SUBMARINE FORCE WHERE THE UNITED STATES MAINTAINS TACTICAL UNDERSEA SUPERIORITY TODAY OVER THE SOVIET ATTACK SUBMARINE FLEET. WE HAVE ACHIEVED THIS POSITION OF SUPERIORITY THROUGH A NATIONAL POLICY WHICH HAS CONSISTENTLY SUPPORTED OUR ATTACK SUBMARINE FORCE AS ONE OF THE UNITED STATES' MOST EFFECTIVE WEAPONS SYSTEMS, BOTH IN ITS MILITARY CAPABILITY AS WELL AS ITS COST EFFECTIVENESS.

THE ATTACK SUBMARINE IS RECOGNIZED AS, PERHAPS, OUR MOST SURVIVABLE OFFENSIVE NAVAL PLATFORM, UNIQUELY CAPABLE OF EXECUTING THE NATIONAL MARITIME STRATEGY SHOULD A CONFLICT OCCUR. OPERATING ALONE, UNSUPPORTED, AND IN HOSTILE WATERS, ATTACK SUBMARINES ARE SINGULARLY CAPABLE OF ENGAGING THE MOST FORMIDABLE UNITS OF THE SOVIET FLEET, HOLDING THOSE VITAL SEA AREAS THAT THE SOVIETS MUST CONTROL AT RISK, AND OCCUPYING THE SOVIET ATTACK SUBMARINE FORCE IN DEFENSIVE MISSIONS. ADDITIONALLY, WITH THE INTRODUCTION THIS YEAR OF THE TOMAHAWK LAND ATTACK CRUISE MISSILE, THEY WILL BE CAPABLE OF STRIKING TARGETS DEEP WITHIN THE

SOVIET UNION. OPERATING WITH OUR CARRIER BATTLE GROUPS IN THE DEFENSE OF OUR SEA LINES OF COMMUNICATION OR IN POWER PROJECTION ROLES, ATTACK SUBMARINES PROVIDE VITAL ASW DEFENSE OF THE BATTLE GROUP AND ARE ALSO AVAILABLE TO THE BATTLE GROUP COMMANDER TO BE EMPLOYED IN A VARIETY OF OFFENSIVE MISSIONS RANGING FROM SINKING SOVIET FLEET UNITS TO SPECIALIZED MISSIONS INVOLVING SPECIAL WARFARE UNITS. THE ATTACK SUBMARINE, COVERT, MOBILE, HEAVILY ARMED, AND ABLE TO ENDURE IN HOSTILE WATERS, REPRESENTS ONE OF THE BEST BUYS IN OUR DEFENSE ARSENAL.

THE IMPORTANCE OF ATTACK SUBMARINES IN NAVAL WARFARE HAS NOT BEEN LOST ON THE SOVIETS. THE SOVIET UNION CONTINUES TO ACCELERATE THEIR EFFORTS TO ACHIEVE UNDERSEA SUPERIORITY THROUGH MODERNIZATION OF THEIR SUBMARINE FLEET. IN THE PAST TEN YEARS THE SOVIETS HAVE DEVELOPED TWELVE NEW CLASSES OF NUCLEAR AND DIESEL SUBMARINES WHILE WE HAVE DEVELOPED TWO. LAST YEAR ALONE, THE RATE AT WHICH THE SOVIETS INTRODUCED NEW ATTACK SUBMARINE CLASSES AND CONVERTED STRATEGIC SUBMARINES TO ATTACK SUBMARINE CONFIGURATIONS EXCEEDED ANY PREVIOUS YEAR'S EFFORT. THE MASSIVE INFUSION OF MANPOWER, RESOURCES, AND TECHNOLOGY INTO THE SOVIET ATTACK SUBMARINE PROGRAM IS A CERTAIN INDICATOR THAT WE ARE BEING CHALLENGED ON AN UNPRECEDENTED SCALE TO DEFEND OUR UNDERSEA SUPREMACY. IT IS EQUALLY OBVIOUS THAT WE CAN NO LONGER REST SECURE IN THE ASSURANCE THAT OUR FEWER ATTACK SUBMARINES WILL REMAIN MORE CAPABLE THAN THE LARGE NUMBERS OF SOVIET SUBMARINES

DUE TO OUR ADVANCED TECHNOLOGY. WE ARE BECOMING INCREASINGLY AWARE OF CONCENTRATED SOVIET EFFORTS TO SILENCE THEIR SUBMARINES AND TO EQUIP THEM WITH NEW AND MORE EFFECTIVE UNDERSEA ACOUSTIC DETECTION SYSTEMS.

CLEARLY WE MUST ASSESS OUR STRENGTH TODAY AND PROCEED WITH A BALANCED PROGRAM FOR EFFECTIVELY AND AFFORDABLY MODERNIZING OUR ATTACK SUBMARINE FORCE FOR THE FUTURE.

TODAY WE HAVE A READY AND CAPABLE FIGHTING FORCE CONSISTING OF TWENTY-SIX 688 CLASS, THIRTY-NINE 637 CLASS, THIRTEEN 594 CLASS AND NINE PRE-594 CLASS ATTACK SUBMARINES AS WELL AS FOUR FORMER STRATEGIC SUBMARINES OF THE 598 AND 608 CLASSES FOR A TOTAL OF NINETY-ONE NUCLEAR ATTACK SUBMARINES. WE ARE PROGRESSING STEADILY TOWARD ACHIEVING OUR GOAL OF 100 ATTACK SUBMARINES AND WILL REACH THIS NUMBER IN 1990. TWENTY-SIX 688 CLASS SUBMARINES HAVE BEEN DELIVERED TO DATE AND A TOTAL OF FORTY-FOUR HAVE BEEN AUTHORIZED FOR CONSTRUCTION THROUGH FY84. THE FY85 BUDGET CONTAINS FUNDING FOR FOUR 688 CLASS ATTACK SUBMARINES WHICH ARE ESSENTIAL TO REACHING OUR FORCE LEVEL OF 100 NUCLEAR ATTACK SUBMARINES BY 1990. WE ARE FIRMLY COMMITTED TO THIS PLAN AND HAVE ACCORDED HIGH PRIORITY TO THIS PROCUREMENT EFFORT.

IN LOOKING TO THE FUTURE OUR PRIORITIES MUST BE CAREFULLY ORDERED TO ENSURE WE RETAIN UNDERSEA SUPERIORITY. THE ONLY METHOD OF ENSURING THAT WE MAINTAIN SUPERIORITY IN UNDERSEA WARFARE TO OFFSET NUMERICAL INFERIORITY IS THROUGH

PROGRESSIVE MODERNIZATION OF OUR SUBMARINE FLEET. IN THE NEAR TERM WE MUST MODERNIZE EXISTING CLASSES TO PROVIDE THEM WITH THE TACTICAL STAMINA AND VITALITY TO MEET THE THREAT TODAY AND THROUGH THE 1990's. THE MOST DRAMATIC EXAMPLE OF OUR NEAR TERM MODERNIZATION PLAN IS THE 688 CLASS IMPROVEMENT PROGRAM WHICH IS DESIGNED TO INCORPORATE EXTENSIVE IMPROVEMENTS IN THE 688 CLASS IN KEY AREAS SUCH AS QUIETING AND ACOUSTIC SENSOR ENHANCEMENT WITH THE CONCURRENT INTRODUCTION OF NEW MILITARY CAPABILITIES; A MORE POTENT STRIKE CAPABILITY WILL BE AFFORDED BY THE INSTALLATION OF A TOMAHAWK CRUISE MISSILE VERTICAL LAUNCH SYSTEM. THIS PROGRAM WILL ENSURE THAT THE 688 CLASS RETAINS THE MARGIN OF SUPERIORITY OVER THE SOVIETS FOR THE NEAR TERM.

TO ADDRESS THE THREAT POSED BY THE ADVANCED SUBMARINE DESIGNS WHICH THE SOVIETS WILL BEGIN INTRODUCING IN THE MID-90s, WE WILL NEED A SUBMARINE OF EVEN GREATER CAPABILITY. THE EXTENSIVE IMPROVEMENTS WHICH WE HAVE PROGRAMMED INTO THE 688 WILL HAVE EXHAUSTED THE AVAILABLE MARGIN FOR FUTURE GROWTH IN THIS CLASS AND OUR 637 CLASS WILL BE PHASED OUT OF SERVICE AS IT REACHES THE END OF A 30 YEAR SERVICE LIFE. ACCORDINGLY, OUR NEXT PRIORITY MUST BE THE DEVELOPMENT OF A NEW DESIGN SSN.

TO SUPPORT THE DEVELOPMENT OF A NEW DESIGN SSN, AN EXTENSIVE AND EXHAUSTIVE SEARCH OF CURRENT AND PROJECTED SUBMARINE-RELATED TECHNOLOGY WAS UNDERTAKEN IN 1982 TO EXAMINE THOSE AREAS THAT HAD POTENTIAL FOR APPLICATION IN A NEW NUCLEAR ATTACK SUBMARINE

EXPECTED TO REACH THE FLEET IN THE MID-1990s. WE STRETCHED TO INCORPORATE THE MOST PROMISING RESEARCH AND DEVELOPMENT EFFORTS IN THE NEW DESIGN SSN. AT THE SAME TIME WE RECOGNIZED THAT SOME DEVELOPMENTAL RISK WAS INEVITABLE IN ORDER TO DESIGN AND COMMENCE CONSTRUCTION OF A SUBMARINE IN 1989 CAPABLE OF MEETING THE BEST SOVIET SHIPS AND SUBMARINES WHICH WILL BE AT SEA IN THE 1990s. WHILE WE FEEL THAT THE RISK IS MANAGEABLE, WE HAVE PROBED THE TECHNICAL COMMUNITY EXTENSIVELY AND WILL PRODUCE A SUBMARINE THAT WILL BE QUIETER, FASTER, ABLE TO CARRY MORE WEAPONS, DETECT THE ENEMY AT GREATER RANGES AND ENGAGE MORE TARGETS THAN ANY SUBMARINE EVER DESIGNED BY THE UNITED STATES. FURTHERMORE, THIS NEW DESIGN SSN WILL HAVE THE DESIGNED GROWTH CAPABILITY TO ACCOMMODATE NEW MISSIONS AND EMERGING TECHNOLOGIES OF THE TWENTY-FIRST CENTURY. THE NEW DESIGN SSN IS TRULY A SHIP DESIGNED TO FIGHT IN THE ENEMY'S "BACKYARD," SUSTAIN FOR LONG PERIODS OF TIME IN THE MOST STRESSFUL OCEAN BATTLE ZONES AND PREVAIL AGAINST THE BEST OF THE SOVIET FLEET.

WE ARE REQUESTING FUNDS IN THE FY85 BUDGET TO FOCUS AND ACCELERATE THE RESEARCH AND DEVELOPMENT EFFORTS TO BRING THIS SUBMARINE, NOW IN PRELIMINARY DESIGN, TO THE FLEET AS SOON AS POSSIBLE WITHIN THE CONSTRAINTS OF AVAILABLE TECHNOLOGY AND REASONABLE RISK AT AN AFFORDABLE PRICE.

OUR FINAL PRIORITY FOR MODERNIZATION MUST BE THE CONTINUED PROBING OF THOSE TECHNOLOGIES WHICH OFFER PROMISE IN THE VERY

LONG TERM FOR SUBMARINE DEVELOPMENT. THIS PLAN MUST INCLUDE THE DEVELOPMENT OF ADVANCED HULL MATERIALS, ADVANCED CONCEPTS FOR NEW SENSORS AND WEAPONS AND ALSO THE DEVELOPMENT OF THOSE TECHNOLOGIES WHICH WILL YIELD MORE SPEED AND COVERTNESS FOR OUR SUBMARINES.

AS WE MODERNIZE WE MUST REMAIN FOCUSED ON THE PRIMARY OBJECTIVE OF PROVIDING A FORCE TO EXECUTE THIS NATION'S MARITIME STRATEGY IN THE MOST COST EFFECTIVE MANNER. REPEATEDLY WE ARE ASKED WHY WE DO NOT BUY DIESEL SUBMARINES TO REDUCE THE COST OF OUR SUBMARINE FORCE. A DIESEL SUBMARINE SIMPLY DOES NOT HAVE THE MILITARY CHARACTERISTICS TO BE EMPLOYED IN A ROLE WHICH SUPPORTS A FORWARD NAVAL STRATEGY. SPECIFIC DEFICIENCIES OF DIESEL SUBMARINES IN THIS REGARD INCLUDE DEBILITATING LIMITATIONS IN THOSE CRITICAL QUALITIES OF COVERTNESS, MOBILITY AND ENDURANCE. A FORWARD NAVAL STRATEGY DEMANDS A SUBMARINE WITH COVERTNESS TO REMAIN UNDETECTED FOR LONG PERIODS, WITH THE ENDURANCE TO TRANSIT LONG DISTANCES AND SUSTAIN IN FORWARD PATROL AREAS, WITH THE SPEED TO RESPOND QUICKLY TO TACTICAL OPPORTUNITIES AND WITH THE VERSATILITY AND FLEXIBILITY TO ACCOMMODATE THE CHANGING CHARACTER OF WAR AT SEA.

OUR ALLIES, HOWEVER, DO MAINTAIN OVER 140 OPERATIONAL DIESEL SUBMARINES WHICH CAN BE UTILIZED IN ROLES WHERE MISSION REQUIREMENTS, TACTICAL AIR SUPERIORITY, GEOGRAPHY AND SUPPORT FORCES PERMIT THEIR EMPLOYMENT. IN TIME OF WAR, THOSE SUBMARINE REQUIREMENTS WHICH CAN BE ACCOMMODATED BY DIESEL SUBMARINES WOULD

BE ADEQUATELY FILLED BY ALLIED FORCES, ALLOWING THE U.S. SUBMARINE FORCE TO EXECUTE OUR MARITIME STRATEGY. IN SUMMARY, IN VIEW OF THE SCARCE RESOURCES WHICH WE MUST APPLY TO MEETING OUR WARTIME COMMITMENTS, DIESEL SUBMARINES SIMPLY DO NOT POSSESS THE CHARACTERISTICS TO CARRY OUT REASONABLE MISSIONS IN THE CONTEXT OF U.S. MARITIME STRATEGY.

OUR ATTACK SUBMARINE ARSENAL IS EQUIPPED TO PROVIDE OUR SHIPS TODAY WITH THE RANGE OF WEAPONS TO ENGAGE THE MOST CAPABLE UNITS OF THE SOVIET FLEET WITH DEADLY EFFICIENCY. TODAY'S SUBMARINE LAUNCHED WEAPONS CONSIST OF THE MK-48 TORPEDO, THE ROCKET BOOSTED SUBROC ANTI-SUBMARINE MISSILE AND THE HARPOON AND TOMAHAWK CRUISE MISSILES. THESE WEAPONS ARE BEING UPGRADED OR REPLACED BY ADVANCED SYSTEMS NOW UNDER DEVELOPMENT TO KEEP PACE WITH SOVIET IMPROVEMENTS.

THE MAINSTAY OF THE SUBMARINE WEAPONS INVENTORY IS THE MK-48 TORPEDO. THIS WEAPON CONTINUES TO BE AN EFFECTIVE WEAPON AGAINST TODAY'S SURFACE AND SUB-SURFACE TARGETS. HOWEVER, AS THE SOVIETS CONTINUE TO IMPROVE THEIR SUBMARINES AND SURFACE SHIPS WE MUST UPGRADE THE MK-48 TORPEDO PERFORMANCE TO PROVIDE THE CAPABILITY TO DESTROY DEEP DIVING, HIGH SPEED SUBMARINES, AND THE MOST CAPABLE SURFACE WARSHIPS. THIS UPGRADED PERFORMANCE, AS WELL AS IMPROVEMENTS TO ENSURE EFFECTIVENESS AGAINST ALL SOVIET TARGETS IN ALL ENVIRONMENTS, IS INCLUDED IN THE MK-48 ADVANCED CAPABILITY (ADCAP) TORPEDO. ADCAP IS NEARING COMPLETION OF ADVANCED DEVELOPMENT TESTING AND WILL BE INTRODUCED TO THE FLEET IN 1986.

THE FOLLOW-ON TO SUBROC IS THE ASW STANDOFF WEAPON (ASW/SOW). THIS WEAPON IS ESSENTIAL TO GIVE US THE ABILITY TO SINK ENEMY SUBMARINES OUTSIDE THE OPPONENT'S WEAPON RANGE WITH EITHER A NUCLEAR OR CONVENTIONAL WARHEAD. ASW/SOW WILL BE AVAILABLE TO THE FLEET BEFORE SUBROC IS RETIRED, PROVIDING CONTINUITY IN THE FLEET OF AN EFFECTIVE LONG RANGE ASW WEAPON.

THE HARPOON AND THE TOMAHAWK CRUISE MISSILES PROVIDE OUR SUBMARINE FORCE WITH A PROPER BALANCE OF LONG RANGE WEAPONS FOR ENGAGING SURFACE OR LAND TARGETS. THE TOMAHAWK ANTI-SHIP CRUISE MISSILE ACHIEVED INITIAL OPERATING CAPABILITY IN THE SUBMARINE FORCE ON SCHEDULE IN NOVEMBER 1983. FURTHERMORE, WE ANTICIPATE THAT THE TOMAHAWK LAND ATTACK (NUCLEAR) CRUISE MISSILE WILL REACH INITIAL OPERATING CAPABILITY IN JUNE 1984 AS SCHEDULED. THESE MISSILE SYSTEMS ARE ESSENTIAL IN NUMBERS TO PROVIDE THE FLEXIBILITY FOR SUBMARINES TO RESPOND TO THE VARIED TACTICAL CIRCUMSTANCES CONFRONTING THEM IN WAR AT SEA.

WHILE THE CAPABILITY OF OUR WEAPONS IS ASSESSED AS ADEQUATE TODAY, WE DO NEED TO INCREASE THE NUMBERS IN TORPEDO AND MISSILE INVENTORIES AND TO PROCEED PURPOSEFULLY TO IMPROVE AND DEVELOP NEW SUBMARINE LAUNCHED WEAPONS FOR THE FUTURE.

DEEP SUBMERGENCE PROGRAM

THE DEEP SUBMERGENCE PROGRAM REPRESENTS THE NONCOMBATANT ARM OF THE SUBMARINE FORCE. WITHIN THE PROGRAM ARE THOSE ASSETS NECESSARY FOR THE CONDUCT OF SUBMARINE SEARCH AND RESCUE AS WELL AS THE PERFORMANCE OF OCEAN ENGINEERING TASKS ON OR NEAR THE DEEP

OCEAN FLOOR. DEEP SUBMERGENCE SYSTEMS INCLUDE MANNED UNTETHERED SUBMERSIBLES, DEEP SUBMERGENCE SUBMARINES SUCH AS NR-1 AND DOLPHIN, UNMANNED TETHERED SEARCH INSTRUMENTS AND RECOVERY PLATFORMS, AIR/MIXED GAS DIVING SYSTEMS, AND RELATED SUPPORT SHIPS. WITH THESE SYSTEMS WE HAVE A LIMITED CAPABILITY TO PERFORM OCEAN ENGINEERING RELATED TASKS TO A DEPTH OF 20,000 FEET. FROM A DEPTH LIMITATION STANDPOINT, ONLY 2 PERCENT OF THE WORLD'S OCEAN FLOOR IS INACCESSIBLE. THIS RELATIVELY SMALL, AUSTERE PROGRAM IS PLAYING AN INCREASINGLY SIGNIFICANT ROLE IN THE EXECUTION OF NAVAL AND NATIONAL STRATEGY. BILATERAL AGREEMENTS WITH MANY OF OUR ALLIES FOR THE CONTINGENCY RESCUE OF PERSONNEL FROM DISABLED SUBMARINES HAVE OR ARE BEING NEGOTIATED, AND THE REQUIRED TEMPO OF OPERATIONS RELATED TO THE RECOVERY OF LOST U.S. OBJECTS OF INTRINSIC OR STRATEGIC VALUE IS INCREASING. AS THE EMPHASIS ON DEEP SUBMERGENCE INCREASES, IT WILL BE NECESSARY TO REEVALUATE SUPPORT FOR THIS VERY IMPORTANT PROGRAM INASMUCH AS OUR ASSETS ARE IN NEED OF MODERNIZATION, CALLING INTO QUESTION OUR ABILITY TO RESPOND TO FUTURE DEEP SUBMERGENCE TASKS OF INCREASING SCOPE AND COMPLEXITY. WE ARE CURRENTLY TAKING A HARD LOOK AT OUR FUTURE REQUIREMENTS IN VIEW OF THE TASK BEFORE US.

PERSONNEL

RETENTION OF NUCLEAR TRAINED SUBMARINE OFFICERS REACHED A RECORD LEVEL IN FY83 AS 46% OF THOSE OFFICERS ELIGIBLE FOR

SEPARATION CHOSE TO REMAIN ON ACTIVE DUTY. IT IS ESTIMATED THAT RETENTION IN FY84 WILL SHOW A CONTINUED INCREASE. ADDITIONALLY OUR FY84 PROGRAMS TO ACCESS OFFICERS CONTINUE TO DEMONSTRATE THEIR VITALITY TO ATTRACT OFFICERS IN SUFFICIENT NUMBERS INTO THE SUBMARINE FORCE. THESE SUCCESSES IN RETENTION AND ACCESSION WILL SERVE US EXTREMELY WELL IN FUTURE YEARS, BUT, UNFORTUNATELY, WILL NOT PROVIDE NEAR-TERM RELIEF FOR OUR EXTREMELY SERIOUS SHORTAGE OF EXPERIENCED, MIDDLE GRADE NUCLEAR TRAINED SUBMARINE OFFICERS. WE NOW HAVE 415 MORE REQUIREMENTS THAN INVENTORY IN THE MIDDLE GRADES OF LIEUTENANT COMMANDER (O-4) THROUGH CAPTAIN (O-6). THIS 24% SHORTAGE WILL INCREASE TO A PEAK OF 31% IN FY89. TO AVOID EXACERBATING THIS PROBLEM, IT IS ESSENTIAL THAT LOSSES OF EXPERIENCED NUCLEAR TRAINED SUBMARINE OFFICERS BE KEPT TO A MINIMUM WHILE CONTINUING TO ACHIEVE ACCESSION AND RETENTION GOALS. SEVERAL INITIATIVES WHICH REQUIRE CONGRESSIONAL ACTION ARE ESSENTIAL TO THESE EFFORTS.

-- A NUCLEAR OFFICER INCENTIVE PAY IMPROVED TO MORE JUSTLY REWARD OUR MID-GRADE OFFICERS IS NEEDED.

--SUBMARINE PAY NEEDS ADJUSTING TO MAKE UP FOR EROSION IN VALUE SINCE 1981 AND TO PROVIDE AN IMPROVED INCENTIVE VALUE FOR OUR MIDDLE GRADE OFFICERS.

-- SPOT PROMOTION (JUNIOR OFFICERS BEING PROMOTED TO THE RANK OF THE JOB) AUTHORITY SHOULD BE PERMANENTLY ESTABLISHED. AUTHORIZATION FOR THIS IMPORTANT PROGRAM WILL EXPIRE ON 30 SEPTEMBER 1984.

THE SUBMARINE ENLISTED PERSONNEL SITUATION HAS IMPROVED OVER LAST YEAR. ACCESSION AND RETENTION STATISTICS ARE HIGHER, AND AT-SEA SUPERVISORY MANNING, WHICH WAS AT A SERIOUS LOW OF 77% JUST TWO AND ONE HALF YEARS AGO, NOW HOVERS AT AROUND 100%. TO AVOID A RETURN TO PAST MANNING SHORTFALLS, WE MUST CONTINUE TO RECOGNIZE AND REWARD THE ENLISTED SUBMARINE SAILOR FOR THE DIFFICULT TASKS AND RESPONSIBILITIES HE MUST FULFILL.

THE SUBMARINE SELECTED RESERVE FORCE PLAYS A KEY ROLE IN OUR MOBILIZATION READINESS. OFFICERS AND ENLISTED RESERVISTS ARE ASSIGNED TO MOBILIZATION BILLETS FOR WHICH THEY MAINTAIN UNIQUE QUALIFICATIONS. WE HAVE MOBILIZATION BILLETS ON SUBMARINE GROUP AND SQUADRON STAFFS AS WELL AS ON ALL SUBMARINE SUPPORT UNITS. WE ARE CURRENTLY ABLE TO MAN THESE SELECTED RESERVES TO AUTHORIZED LEVELS THROUGH VIGOROUS RECRUITING.

SUMMARY

I AM VERY PROUD OF OUR SUBMARINE FORCE. IT HAS AN OUTSTANDING RECORD OF PROFESSIONALISM AND READINESS AND HAS SERVED OUR COUNTRY WELL FOR 84 YEARS. OUR STRATEGIC SUBMARINES WILL CONTINUE TO PROVIDE A FORMIDABLE DETERRENT FORCE TO ENSURE OUR SECURITY. OUR ATTACK SUBMARINES ARE PREPARED TO CARRY THE FIGHT TO ANY ENEMY DEEP IN HIS HOME WATERS. OUR FINE SUBMARINES AND SUPPORT SHIPS ARE MANNED WITH INNOVATIVE, DEDICATED YOUNG MEN AND WOMEN WHO ARE A TREMENDOUS CREDIT BOTH TO THEMSELVES AND THE COUNTRY THEY SERVE.

Senator Cohen. Thank you very much, Admiral Thunman.

Admiral Walters?

STATEMENT OF VICE ADM. ROBERT L. WALTERS, U.S. NAVY, DEPUTY CHIEF OF NAVAL OPERATIONS (SURFACE WARFARE)

Admiral Walters. Mr. Chairman, I am here to cover primarily the fiscal year 1985 shipbuilding request this year. I would request that my prepared statements on the fiscal year 1985 shipbuilding and conversion budget request and the fiscal year 1985 weapons procurement, Navy, be entered into the record.

Senator Cohen. Admiral, your statements and those of your colleagues will all be included in full in the record.

Admiral Walters. That would also include, in addition to the SCN and WPN, the OPN and Other Procurement Navy statement of Rear Admiral Cooper.

Senator Cohen. Yes.

Admiral Walters. We have a lot of ground to cover this morning, so I only intend to take a very few minutes to discuss, very briefly, the highlights of the shipbuilding program.

We are requesting the continuation of a number of highly successful ship construction and conversion programs. Admiral Thunman has covered submarines. On the aviation side, of course, we are requesting full funding for the third CV SLEP, which in this case is the USS *Independence.*

We have learned a great deal from the *Saratoga* and *Forrestal* SLEP's, which will be helpful with the *Independence.*

Forrestal is now half way through her repairs and is on schedule and within cost.

We have four amphibious programs in this year's budget which reflect the importance we place on this element of our maritime strategy.

The first is the LSD-41 class, for which there have been four ships authorized thus far, and this year we are requesting two more.

We have very favorable option prices for these ships as part of a multiship package.

These are superb amphibious ships which, like the LHD, have been designed to take full advantage of the new landing craft air cushion.

Last year, the Congress aproved the first LHD, which is now under contract at Ingalls. This year, we are requesting long lead funding for the second of the class which will be in next year's budget.

The first landing craft air cushion will deliver later this year. We are requesting nine of these craft as we ramp up to the desired annual production rate of 12.

With the helicopter, the LCAC provides amphibious warfare a means of moving into the modern era. It offers enormous potential, and I am excited about the future of the amphibious concept employing the LCAC.

In order to meet and sustain the lift requirements which the Navy and the Marine Corps have agreed to, we need to extend the service life of some of our existing ships, the LPD-4 class. These ships are now about 15 years old, in excellent material condition, and we consider them to be excellent candidates for a service life extension program which will extend their lives from 30 to 45 years.

This year, we are requesting long lead funding for the first of the LPD-4 SLEP.

In the area of mine countermeasures, we are requesting continuation of the MCM-1 program, which is called the *Avenger* class. Five of the required 14 ships of this class are already under contract. All of the previous weight and design issues have been resolved. Both contractors are building on schedule and within cost.

We are still working diligently to resolve the final issue, which concerns the precision inertial navigation system integration, and I am confident that the problems that we have had here will be resolved in time to permit delivery of the integrated navigation system to the lead ship of this class without any problems.

Later this year, we expect to award the contract for the lead ship of the MSH class, which is the smaller of the two minesweepers. This coastal minesweeper/hunter will complement the larger MCM-1 class and, when delivered, will greatly improve our ability to breakout of our own ports and coastal approaches.

The fiscal year 1985 request continues the building program for fleet oilers. In the 1970's, the Congress appropriated five of the AO-177 class, which have all been delivered. So far, you have approved four of the larger TAO-187 class. This is a ship which is built primarily to merchant marine standards and can be constructed by a number of yards throughout the country.

We anticipate intense competition for these ships. Later in the 5-year plan, we will enlarge the tank capacity of the current AO-177 class to 180,000 barrels, to make them the equivalent of these TAO's.

Our present oiler fleet is old and difficult to maintain. We need to build the TAO class at the rate of three per year if we are to be able to support our worldwide operations in the years to come.

There are also several types of auxiliary and sealift support ships in this year's budget, including the resumption of the TAGOS construction line. We have 12 of these ships under contract from prior year programs, and anticipate delivery of the first of the class later this year. The six TAGOS requested in the fiscal year 1985 and fiscal year 1986 budgets will brings us to 18 ships against our ultimate requirement of 24.

As you know, we are embarking on an extensive program to upgrade our strategic sealift. One of the important elements of this plan is the TAVB.

This ship is designed to transport a Marine aviation intermediate maintenance activity. This intermediate maintenance activity is designed to support both rotary and fixed wing aircraft of a Marine air wing.

After the IMA is off-loaded, the ship can then be utilized in any normal conventional sealift role.

The last auxiliary I want to discuss with you is the ocean survey ship, or TAGS. Due to the extensive requirement for continuing ocean survey which exists, we are able to justify, as suggested by the Congress last year, a new construction program instead of a conversion program. We expect intensive competition in this program as well because this is a merchant type of hull.

Moving now to the major surface combatant programs, I would first like to address the battleship reactivation program.

Later this month, *Iowa* will recommission as the second of the four we require, and after an accelerated workup period is scheduled to deploy early this summer.

The ship has just completed its trials, including the inspection and survey team, and has come through with flying colors.

Full funding for the *Missouri* reactivation is presently included in the fiscal year 1985 budget request. But, as you know, we have a reprogramming request before the Congress which will permit us to accelerate the delivery of *Missouri* by 3 months and greatly improve the workload shortfall recognized at the Long Beach Naval Shipyard.

In addition, we are investigating ways which would permit full funding of the ship in fiscal year 1984, utilizing prior year savings.

The performance of *New Jersey* in the Mediterranean has validated the wisdom of their reactivation and made even more important the urgency to get all of the battleships into active service.

Moving now to the CG-47 Aegis cruiser, this year we are requesting three more of this class, the 14th through the 16th. The lead ship, *Ticonderoga,* is in the Mediterranean and in the process of rewriting the book on antiair warfare.

I have served on four guided missile ships, commanding two of them, and I assure you from my professional knowledge and personal experience that this is the finest antiair warfare system we, or any navy, has ever put to sea.

Later this morning, we will go into greater detail on the issue of *Aegis* testing. But at this time I will tell you that I am personally very pleased with the capability which *Ticonderoga* has displayed during her deployment with the Sixth Fleet

Additional testing under operational conditions will be conducted following her departure from the Mediterranean. We have not attempted to deny any test results to the Congress. Later today, we will fully discuss test results within the limits of security in open session.

The major new start this year is the *Arleigh Burke* class guided missile destroyer, the DDG-51.

Last year, the Congress appropriated long lead funding for this ship, and this year we are requesting the balance for the lead ship.

I would like to talk for a moment about the requirements for this ship.

Arleigh Burke is the destroyer of the future. She will replace the DDG-2 and DDG-37 class ships as they reach block obsolescence by the early 1990's. She is designed as a general purpose, multimission "work horse" of the fleet.

DDG-51 brings enhanced survivability and service life margin for 35 years of service to our Naval forces. She will be able to operate offensively as a unit of surface action groups, amphibious task forces, and carrier battle groups, and she requires a derivation of the *Aegis* combat system deployed in *Ticonderoga.*

With her state-of-the-art combat system, *Arleigh Burke* is capable of simultaneous engagements of air, subsurface and surface threats across a broad spectrum of destroyer tasks, which contribute significantly to our maritime strategy.

We have satisfied our frigate requirements, but we have not built guided missile destroyers since the early 1960's. We need capable destroyers in every Naval force we employ. The ones we have are over 20 years old and cannot cope with the future threat.

For many years, the Navy has carefully studied requirements for the destroyer which would replace those in service. The evolving Russian threat and fiscal reality require a general purpose, multimission and battle group capable ship.

While capable, of course she must also be affordable in the numbers required to distribute offensive and defensive firepower. The future destroyer must achieve added target detection capability, better reaction time, more magazine capacity, and greater inherent survivability than her predecessors.

Arleigh Burke's contract design is all but completed. She is a tough, fully capable and survivable ship. Her multimission capability is centered around a downsized *Aegis* combat system similar to that in the CG-47 class cruiser.

DESTROYER VERSUS CRUISER COMPARISONS

Senator COHEN. Admiral, let me just interrupt your prepared remarks briefly. Tell us what the difference is. What does the destroyer have that the frigate does not have? What does the destroyer not have that the cruiser does have?

In other words, why do we need this ship? Why can't we either have a better frigate or a slightly less expensive or complicated cruiser, as opposed to a destroyer? I think that probably is the fundamental question in terms of need and also in terms of cost.

Admiral WALTERS. The size and cost of this ship lie almost in between the frigate and the cruiser. The capability is far on the side of the cruiser. The frigates are designed primarily for antisubmarine warfare.

We placed a relatively short-range missile system on the frigate to provide self defense. It does not provide for the defense of anything other than the ship and the system it is installed on.

The destroyer has essentially the same combat system as the cruiser. What we have not put into the destroyer is, well, we have put in one less gun. We control about six less missiles inflight simultaneously in the destroyer than we can in the cruiser. We carry about 30 less missiles. We do not have the command and control and communications facilities in the destroyer to handle the staff, which would direct a battle group, and the destroyer would simply be one of the participants.

The final things is that we have not installed a helicopter hangar on the ship. The ship can operate, land, take off, refuel, and control the helicopter and all of its ASW missions, but it cannot do long-term maintenance because there is no hangar.

The destroyer also has growth margin in it for future systems in its 35 year life. It is a little differently designed in the hull, and it is designed to be able to maintain higher speeds, higher sustained speeds in heavy seas, by virtue of its hull design.

Finally, it has many survivability features built into it which we did not put into the cruiser. For example, we have used aluminum for many years in the superstructures of our ships. We have been convinced over the years, and it has been verified, for example, in the Falklands situation with the British ships, that aluminum is not the best material to put into the ship.

The DDG is an all-steel ship with lots of survivability built into it from the standpoint of the wedge design and the kinds of material used in it.

Senator **Cohen**. We will deal with cost in just a moment. But you mentioned the subject matter of aluminum.

Is that not one of the major criticisms directed toward the cruisers, the use of aluminum?

Admiral **Walters**. I have never heard that as a major criticism, Senator. But, certainly, there has been criticism over the past of aluminum in general used in ships. I had not heard that particularly directed at the cruiser. But she does have an aluminum superstructure, as do most of our ships.

Senator **Cohen**. I was just wondering. You make a positive statement on the destroyer, which does not have an aluminum superstructure, and I recall the lessons of the Falklands. Would these not also argue against use of aluminum in the cruisers?

Admiral **Walters**. Well, if we had a choice, I think today we would have built the ship with a steel superstructure. The problem is that the cruiser represents the third evolution of a basic design of the *Spruance* class destroyer. The *Spruance* class destroyer had an aluminum superstructure. We have since modified it once to make the four DDG's that were built orginally for Iran that we now have in our Navy, and that had a new combat system in it. Then we took that design and redid it again to put the *Aegis* system in it, in what now constitutes the CG-47. In all of those changes, the top-side weight was important. So, therefore, we stuck with aluminum, and this was the reason for going to it in the first place, because it is lighter and you can put the things topside that you need to put there, in terms of weapons and electronics. You are able to put all that in the existing hull.

Senator **Cohen**. In other words, you made a trade-off here, between whatever risks are involved, such as burning or heat from a strike against the cruiser—versus the capability that you can place on the cruiser, limited by weight and you came out with a positive? Is that what you have done?

FIRE PROTECTION CAPABILITY OF SHIPS WITH ALUMINUM STRUCTURE

Admiral **Walters**. Yes, sir. That, essentially is the answer. And, we have improved the passive fire protection capability in the ship. For example, in the cruisers, all of the new ships that we have built for roughly the past 5 years, we are not putting in—I hesitate to use the term "fiber-fax" because I think that is a trade name, but it is a fire retardant insulation material, which is designed to keep heat away from aluminum long enough, 30 minutes, for example, long enough to permit you to fight a fire and put it out in a space before the aluminum gets hot enough to lose any of its structural properties.

That kind of material is being installed in all of our cruisers. Also, we have established fire boundaries in the cruisers, so that you can contain the fire. We have improved the firemain loops through the ship. We have installed HALON, which is an almost instant fire extinguisher in all of the machinery spaces. We have the latest firefighting equipment that exists on these ships.

So, we have taken those measures to counter the fact that we do have aluminum superstructure.

DESTROYER, CRUISER, FRIGATE COST COMPARISONS

Senator COHEN. What about the costs, Admiral? Discuss the differences destroyer versus cruiser versus frigate, please.

Admiral WALTERS. The destroyer, on a lead-ship basis, of course, is about the same price as the cruiser, which is now in followon series production. Because the destroyer is smaller, has a little less capability, and, because of the way we have designed it, it is going to be a cheaper ship. There is just no question about it. We have every reason to believe that the destroyer is going to cost about 70 percent of the cruiser once we get it into series production.

So, whatever the cost of the cruiser is, that being one, the destroyer is going to be 0.7.

We have had a considerable number of independent cost analysts who have looked at this, including the Department of Defense, during our DSARC, and we feel very confident that these numbers are correct and that we can build this ship significantly cheaper.

To give you another benchmark, for example, if you were to build the same number of cruisers, the then-year cost would be $13 billion more than building the 29 destroyers we are asking for.

Senator COHEN. Why don't you now continue with your prepared remarks, Admiral.

Admiral WALTERS. The destroyer's operating profile will support surface action groups, underway replenishment groups, amphibious task groups, as well as carrier battle groups.

The destroyer is highly capable, and we even believe affordable in the numbers required.

In terms of importance to the Navy, the DDG-51 is our No. 1 priority surface combatant in this year's budget request.

The advancing performance of the Soviet fleet demands nothing less than the combat capability that we have designed into the *Arleigh Burke*. The fundamental combat system architecture embodied in the *Aegis* system design allows us to evolve our capability and keep measured pace with the advancing threat.

The Navy requires a mix of surface combatants such that, given a specific mission, the fleet commander can size his force to achieve a composite capability to defeat expected threat numbers and capability which may be associated with a given offensive mission.

Because of the approaching block obsolescence of the DDG-2 and the DDG-37 class, the Navy must begin construction of the DDG-51 in fiscal year 1985 or experience a serious degradation in naval strength and in our ability to maintain a forward strategy. There is no alternative, known to the Navy, which can provide the needed capability that this ship will provide at equal or less cost.

Without this ship, our entire maritime strategy will be jeopardized in the years to come. Fiscally, we cannot afford to build or man more cruisers than already planned. Tactically, we cannot afford to build a ship less capable than the DDG–51.

We have squeezed the ship in the design process with affordability in mind, but its warfighting potential is intact. We will continue to exploit every avenue to build the ship as cheaply as possible.

Competition among the shipbuilding and defense industry in general is keen, and we expect to deliver these ships below our present cost estimates. I urge your continued support for this program.

This completes my statement, Mr. Chairman.

[The prepared statement of Vice Admiral Walters follows:]

PREPARED STATEMENT OF VICE ADM. ROBERT L. WALTERS, U.S. NAVY, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SURFACE WARFARE

FISCAL YEAR 1985 SHIPBUILDING AND CONVERSION BUDGET REQUEST

Mr. Chairman and distinguished members of the Committee, I am Vice Admiral Robert L. Walters, USN, the Deputy Chief of Naval Operations for Surface Warfare and the Sponsor for the Shipbuilding and Conversion, Navy (SCN) Appropriation.

Today I am privileged to have the opportunity to present to you the Navy's Shipbuilding and Conversion budget request for fiscal year 1985 and to explain our requirements for this year as well as for the remainder of the FY 1985-1989 five year shipbuilding plan.

I am here to discuss ships and warfighting capability. Ships and submarines provide unique capabilities no other service possesses; they are what constitute a Navy; they represent a powerful component of our national military strength; our Navy has been an indispensible element of national strength since this nations' inception. Today, defense treaties link the U.S. to 41 countries, of which only two border the United States. Five of every six countries of the world border the seas. Ninety-five percent of the world's population lives within 600 miles of the 20 fathom curve. The radius of influence of a Carrier Battle Group or Surface Action Group with cruise missile exceeds 1200 NM, and such a force can reposition 700 NM a day. A carrier battle force in dispersed disposition will be contained in an area of about 10,000 square miles and exercise surveillance and destructive power over about 100,000 square miles against enemy forces. Such a force can stay in-theater for weeks or months, or move swiftly to another location on short notice.

Your Navy has been called upon repeatedly to project U.S. influence in distant places - over 180 times since the end of World War II, under eight Presidents. Our economy as well as our national security depends on maritime strength. In short we need a Navy and a Navy is ships and submarines. Winston Churchill summed it up so well during his time when he said "nothing in the world, nothing you may think of, or anyone may tell you; no arguments, however specious; no appeals, however seductive, must lead you to abandon that naval superiority on which the life on our country depends."

The Navy is most conscious of the national concern about our economy, a continued budget deficit and the size of the defense budget. Since I was here last year, we have reduced our five year program by $17,617,100 and we are continuing to seek further reductions as we commence planning for the FY-86 budget. We are pleased with the savings and efficiencies already realized and we will continue to seek further improvements and cost reductions. Our SCN program continues emphasizing a balance of capability to deter nuclear war as well as conventional conflicts, but we plan our forces to provide the firepower and staying power to win if we must fight.

The past year has been an eventful period for the Navy-Marine Corps team. The Congress once again gave unstinting support to the shipbuilding budget at a time when the operating forces of the Department of the Navy were heavily involved in meeting national commitments around the globe.

The Marine presence off Lebanon and the offshore Navy support of that operation have been headlined by all parts of the news media and continue as a visible demonstration of the mobility, flexibility and staying power inherent in naval forces. We are prepared to fulfill that mission as long as it is required by

National Command Authority. Your recent support for the acceleration of the reactivation of the battleship IOWA permits us to ensure an on-station battleship without undue personal sacrifice by crew members.

The joint operations to free the citizens of Grenada from a repressive regime highlight the capability of the Navy-Marine Corps team to execute National Strategy on short notice. With Army and Air Force cooperation, the joint task force executed its mission quickly and effectively. The surgical insertion, rapid achievement of the objectives and an equally rapid withdrawal are the hallmarks of excellent planning and execution by a force which was properly trained and equipped. It is important to remember that the Marines currently offshore in Beirut are the same troops who participated in the Grenada operations.

Operations were conducted in the Northern Sea of Japan in an attempt to locate the Korean airliner shot down by the Soviet Union. These operations at the edge of Soviet territorial seas required precise coordination by local and theater forces of the Navy and the Air Force both at sea, in Japan, and within the Pacific Command.

Despite these commitments, the Navy continued with its normal peacetime exercise schedule. We participated in national, bilateral and multi-national exercises around the globe. The tempo of operations remains high and the state of training in the Fleet is outstanding. All readiness indicators are improved over the past year and they continue an upward trend. In sum, the Navy today is more ready to execute its assigned missions than in past years.

Over the past three years we have clearly substantiated the requirement for the six hundred ship Navy and are moving toward achieving that goal by the end of 1989. With funds already appropriated we will achieve the required number of deployable aircraft carriers by 1990. We are within reach of our goal of 100 nuclear attack submarines and the increased SSN building program reflected in our five year plan will permit us to achieve and sustain that force level.

The Mine Warfare and Logistic Support Forces, which have been underfunded in the past, are on the road to recovery and the Amphibious building program is on track with Navy-Marine agreement on the requirement and how to best achieve it. The status of Surface Combatants is also improved with the deployment of NEW JERSEY and TICONDEROGA and continued deliveries of Guided Missile Frigates during the past year. The recommissioning in April 1984 of IOWA will give us our second of four battleships.

The authorization this year of the ARLEIGH BURKE class DDG-51 Guided Missile Destroyer will provide a ship with the required warfighting capability as a replacement for aging DDG-2 and DDG-37 class ships. This in combination with the three TICONDEROGA class cruisers requested this year will add much needed modern capability and firepower to the Fleet by the end of this decade.

In addition, the five year plan fully supports the amphibious, mine countermeasures and logistic support ship programs. At Congressional direction we have moved the TACS and TAVB programs into SCN in addition to the funding of Ready Reserve Force Ships. Congress has already provided funding for the TAKR and TAH conversions in SCN and our expanding Sealift requirements continue to be fully funded in this five year plan. In sum, the FY 1985 budget and the five year shipbuilding plan which accompanies it, contain the ships which we require to execute the national strategy.

Reduced SCN Funding

The most dramatic feature of the five year shipbuilding plan which accompanies the President's FY 1985 budget request is the reduction in outyear SCN funding between last year's plan and this submission. As depicted in viewgraph number 1, during the four common fiscal years, 1985-1988, we have reduced the planned SCN request by over $17.6 billion dollars. If we were to extend the FY 1988 line of last year's budget using five per cent inflation and no real growth, and compared that with the FY 1989 request of the current submission, another $7.08 billion has been removed from the SCN requirement, for a total of almost $25 billion dollars over the full five year period. We are sincere in our effort to achieve more realistic and affordable shipbuilding plans and to achieve a degree of stability which permits the shipbuilders and other industry to exercise intelligent corporate planning leading to reduced cost and improved efficiency. The funding reduction also reflects the application in our estimates of cost savings resulting from increased competition, fixed price contracts and lower rates of inflation.

The result of all of these pricing initiatives is a budget submission which depicts as accurately as possible the fiscal resources required to execute the plan.

Ship Deliveries

In calendar year 1983, the Navy delivered twenty-one ships. This total included 1 AD, 1 AO, 1 DD-963, 10 FFG-7, 1 SSBN, 4 SSN-688, 1 TAK conversion, 1 CV SLEP and the acquisition of the third TAFS from Great Britain. During calendar year 1984 we anticipate delivery of two TRIDENT class Ballistic Missile Submarines, 6 LOS

COMPARISON OF SCN IN FY 1984 AND FY 1985 BUDGETS (COMMON YEARS)

FISCAL YEARS

	1985	1986	1987	1988
FY 1984 BUDGET	14,699.0	16,796.6	21,248.2	27,324.8
FY 1985 BUDGET	13,141.9	14,103.9	16,449.2	18,756.5
DELTA	−1,557.1	−2,692.7	−4,799.0	−8,568.3

TOTAL FOR FOUR YEARS: -$17,617.1 BILLION

ANGELES SSN-688 class attack submarines, one CG-47 class cruiser, 7 FFG-7s, the lead ship of the LSD-41 class, 1 TARC, 3 TAGOS, 4 TAKR conversions, 1 TACS and the battleship IOWA. This represents 27 new construction and conversion deliveries which is one of the highest totals in many years.

At the same time, the Soviet Navy has also been active. Since my appearance before this committee last year, the Soviet Union has continued to produce surface ships at a sufficient rate to support their steady growth in naval power. This construction is focused on their goal of a balanced fleet capable of carrying out the full range of naval tasks on a global scale. The most notable event in Soviet surface 1983 shipbuilding was the laying down of the first CTOL aircraft carrier designed to handle high performance aircraft. This brings to fruition the ground work we have been observing for several years. They continue to build KIROV nuclear cruisers by starting construction of the third unit. They also launched the third SLAVA class cruiser, another SOVREMENNY and two more UDALOY class guided missile destroyers. These impressive ships have been complemented by the construction of five amphibious craft (LACC), eleven mine warfare ships, twelve principle combatants, eight small combatants and eight auxiliary ships. Of particular concern is the launching by the Soviet Union of nine submarines of five different classes. The size and sophistication of Soviet ships and the diversity in capability invested in numerous new classes, both surface ships and submarines, reflect a strong dedication to their Navy as an instrument of national power far beyond purely defensive needs. Therefore, we must continue to rely upon technology and superior personnel, and our allies to help offset the large Soviet fleet.

With this as background, I will now discuss our FY 1985 shipbuilding request in some detail.

Strategic Submarine Forces

Our SSBN force is composed of thirty-one submarines of the LAFAYETTE, JAMES MADISON and BENJAMIN FRANKLIN classes and four of the TRIDENT class. Ten SSBNs of the oldest classes previously in inventory have either been deactivated or converted to an attack submarine role.

The TRIDENT submarine is a much more capable ship in every aspect than its predecessors and is equipped with 24 missile tubes vice 16. The first eight of the class will carry the highly capable TRIDENT I missile. Commencing with the ninth ship, which was funded in FY 1981, TRIDENT submarines will be equipped with the even more potent D-5 missile, also known as TRIDENT II. Eventually, the first eight TRIDENTS will be backfitted with TRIDENT II. Total SSBN force capability has also been upgraded by the backfit of TRIDENT I missiles on 12 of the POSEIDON submarines.

Our studies indicate that the building rate of one TRIDENT per year is adequate to meet our nation's strategic needs. Our plans are to build one TRIDENT submarine per year; however, it is feasible to build three TRIDENT submarines every two years without impacting planned SSN construction or opening a new nuclear submarine production facility. The ultimate size of the TRIDENT force will be influenced by arms limitations agreements which may be in effect in the future as well as the eventual capability of the other legs of the strategic triad.

The SSBN remains the most secure member of our nuclear deterrent triad and the added capability which TRIDENT brings to that mission makes the sea launched ballistic missile system a key part of the nation's strategic deterrent for the foreseeable future.

Attack Submarine Forces

Within the six hundred ship Navy, the force level requirement for nuclear attack submarines has been fixed at a minimum of one hundred. This is still a fiscally constrained force level given the growing and increasingly formidable Soviet threat.

To reach and maintain the 100 SSN level, the President's Budget includes twenty SSN-688 class submarines over the five year period and the first of a new design class of attack submarines in FY 1989. We believe that by the late 1980s we will have improved the SSN-688 class to the fullest extent possible and must move toward a ship which will be designed taking full advantage of the latest technology. We still have a qualitative edge in submarine technology but the Soviet Union is cutting into this edge far more rapidly than expected. Their submarine building program is producing large numbers of fast, quiet, deep diving submarines. It will be a challenge to our technical competence to ensure that we retain an adequate qualitative advantage.

Surface Combatant Forces

This category of warships includes frigates, destroyers, guided missile destroyers, guided missile cruisers, and battleships. Over a third of the six hundred ship Navy falls into this category. These ships are designed for a variety of missions which include Anti-Air Warfare, Anti-Submarine Warfare, Anti-Surface Warfare and Strike Warfare.

As we organize our forces for a particular task, surface combatants are required in every type of mission. In Carrier Battle

Groups, Surface Action Groups, Amphibious Groups, Underway Replenishment Groups and in Convoy escort, these Surface Combatants comprise the primary defensive force. With the addition of HARPOON and TOMAHAWK missiles to the surface combatant arsenal, we have moved into an offensive posture which offers on-scene commanders alternative solutions to the traditional strike and anti-surface warfighting methodology.

Surface combatant force requirements are derived from our overall naval strategy and are necessarily somewhat dependent upon carrier and amphibious force levels and the breadth of sea lane defense projected in our national strategy. Since each combatant is an integral and indispensable member of a battle force, we have placed emphasis on total force capability vice numbers of ships in developing a realistically attainable and capable minimum force level objective. Over the past few years, the requirements for surface combatants have remained stable. Support of all projected tasking requires four battleships, thirty-three guided missile cruisers, sixty-seven guided missile destroyers, thirty-seven destroyers and one hundred and one frigates. This is considered our minimum force level objective.

Within this force mix, the most critical element is the pending shortage of guided missile destroyers. The thirty-three ships of the DDG-2 and DDG-37 classes were all delivered in the early 1960s and will reach the end of their thirty year service life in the early 1990s. The only ship class which can address this shortfall in a timely manner with acceptable warfighting capability is the ARLEIGH BURKE DDG-51 class guided missile destroyer. Unless we begin, in FY 1985, to replace the DDG-2 and DDG-37 classes, the surface combatant force will be dangerously short of modern ships to conduct the offensive and defensive missions assigned.

Over the past twenty years, approximately one third of the shipbuilding budget has been allocated to surface combatants. Despite the cost of the high technology capability represented in both the DDG-51 and the CG-47 classes, the average allocated to surface combatants over the five year plan is only thirty-five percent, which sustains the historical precedent.

Amphibious Warfare

Since the five LHA class amphibious ships were appropriated from 1969-1971, the amphibious force was not augmented until the lead LSD-41 was appropriated in Fiscal Year 1981. This ten year hiatus has led to an emerging problem of block obsolecence in the amphibious forces which is now being forcefully addressed with the Navy and Marine Corps in complete agreement as to the lift requirement and how the building program should be structured.

In fiscal 1984, Congress took a major step in support of Marine amphibious lift when it authorized and appropriated funds for the lead ship of the LHD-1 class. Only through the introduction and continued funding of this highly capable modern ship can we achieve our lift goals of a MAF(AE) plus a MAB(AE) by Fiscal Year 1994.

Some armchair strategists believe that amphibious warfare is a thing of the past. To the contrary, the future for amphibious warfare has never been brighter. The introduction of the Landing Craft Air Cushion to the Fleet in Fiscal Year 1985 presages an amphibious capability far beyond that envisioned in the campaigns of World War II and Korea. The ability to launch coordinated attacks from many miles at sea rather than coming near shore is a great step forward. The freedom from the requirement to use only the limited beaches which have the proper characteristics to support a conventional landing makes enemy defense extremely difficult and provides to the Amphibious Force the elements of surprise, concentration of force, and the ability to utilize that force over a much greater geographic area. Thus the LCAC, combined with helicopter assault, truly modernizes amphibious warfare.

In addition to the new construction programs which are in progress, we are introducing a Service Life Extension Program (SLEP) for the LPD-4 class. These ships are in good material condition and, when "slepped," will provide an essential element of our lift requirement through the 1990s.

Logistic Support Forces

Included in this category are the large multi-product ships (AOE/AOR), ammunition ships (AE), fleet oilers (AO/TAO) and combat stores ships (AFS/TAFS). The concept of operations is simple and straightforward; each carrier battle group will have a multi-product "station ship" operating as an integral part of the battle group. These "station" ships provide endurance to the battle group by carrying fuel, ammunition and stores, and will in turn be replenished by oilers, ammunition ships and combat stores ships operating in escorted Underway Replenishment Groups (URGs). These URGs will operate either from CONUS ports or from an advanced logistic base close to the scene of operations. In the event of loss or other non-availability of the station ship, one AO/TAO and an AE may be assigned to the battle group.

The Congress has appropriated four TAOs over the past three years and has funded the purchase of three valuable combat stores ships from the United Kingdom.

This year we are requesting three additional Fleet Oilers and in the remaining years of the five year plan will be introducing new classes of AOE, AE and the "jumboization" of the AO-177 class. The ammunition ships are required to meet force level objectives and eventually to replace the oldest AEs in current inventory. The five year plan requests three AOEs which will raise our station ship inventory to fourteen (seven AOE/seven AOR). Budgeting for a fourth AOE to match the fifteenth deployable carrier is anticipated in FY 1990.

Mine Countermeasure Forces

For many years the mine warfare forces of the U. S. Navy fell prey to higher priority programs. Not until FY 1982 did we request the first new MCM. Since that time, four more MCM-1 class ships have been appropriated as well as the first of a new class of Coastal Minesweeper Hunter, the MSH-1. As you know, we have only three active mine sweepers (MSO) and eighteen in the Naval Reserve Force. The capability of these MSOs to ensure port breakout is tenuous at best and we must move rapidly to build the acceptable risk force of fourteen MCM and seventeen MSH. Despite the fact that these are the most sophisticated and capable mine countermeasures ships ever built, this total of 31 ships is a bare minimum and will dictate sequential clearance of U.S. ports and approaches as well as a heavy reliance on our allies to maintain clearance in their own waters.

FY 1985 Shipbuilding Request

The funding requested in FY 1985 permits the Department of the Navy to continue on the path of restructuring the Navy's Battle Forces and Support Forces to ensure that we remain capable of respond-

FY 1985 BUDGET
SHIPBUILDING AND CONVERSION NAVY (SCN)
($ IN MILLIONS)

PROGRAM	NUMBER	BUDGET REQUEST
TRIDENT	1	1489.5
TRIDENT A.P.	-	265.5
ATTACK SUBMARINE (SSN-688 CLASS)	4	2262.2
ATTACK SUBMARINE A.P.	-	617.8
CARRIER SLEP (CV SLEP)	1*	583.2
CARRIER SLEP (CV SLEP) A.P.	-	181.3
GUIDED MISSILE CRUISER	3	3125.6
GUIDED MISSILE CRUISER A.P. (MK 45 GUN MOUNT)	-	24.4
BATTLESHIP REACTIVATION (MISSOURI)	1*	422.6
GUIDED MISSILE DESTROYER (ARLEIGH BURKE)	1	1173.4
LANDING SHIP DOCK (LSD-41 CLASS)	2	406.0
LANDING SHIP DOCK A.P.	-	83.5
AMPHIBIOUS ASSAULT SHIP (LHD-1 CLASS) A.P.	-	39.2
LPD-4 SLEP A.P.	-	15.0
MINE COUNTER MEASURES SHIP (MCM-1 CLASS)	4	349.5
MISSILE RESUPPLY SHIP (TAK-FBM)	1*	91.1
FLEET OILER (TAO-187 CLASS)	3	562.6
OCEAN SURVELLANCE SHIP (TAGOS)	3	192.9
OCEAN SURVEY SHIP (TAGS)	2	245.0
AUXILIARY CRANE SHIP (TACS)	2*	44.0
AVIATION LOGISTICS SUPPORT SHIP (TAVB)	1*	37.6
AVIATION LOGISTICS SUPPORT SHIP A.P.	-	5.2
LANDING CRAFT AIR CUSHION (LCAC)	(9)	198.8
LANDING CRAFT AIR CUSHION (LCAC) A.P.	-	31.3
SERVICE CRAFT	-	81.2
LANDING CRAFT	-	11.9
STRATEGIC SEALIFT	-	31.0
OUTFITTING	-	204.4
POST DELIVERY	-	179.2
POTENTIAL FUTURE GROWTH	-	187.0
TOTAL **23 NEW CONSTRUCTION** *** 6 CONVERSIONS**	**29**	**13,141.9**

ing to National requirements. We are within sight of the 600 ship Navy which the President has supported. As noted earlier in this statement, we are this year proposing a realistic, affordable and achievable five year plan which represents actual requirements and contains none of the out year enhancement which has previously existed.

Of particular note is the near term stability which this plan represents. The only changes in the FY 1985 request from that of last year is the deletion of one TAO and the addition of one TAGOS. The change of the TACS and TAVB from O&MN/OPN accounts to SCN was done at the direction of the Congress and the shift of TAGS from conversion to new construction was also a Congressional initiative.

I believe that this submission represents a balanced and prioritized acquisition plan which will achieve the goal of 600 ships by the end of 1989 and successfully sustain and more finely balance it in future years.

Even the numbers of ships requested in the plan is stable vis-a-vis last year with 121 new construction vs 124 a year ago and 21 conversions being exactly that previously requested.

This plan is fully supportive of the balanced 600 ship Navy and moves us toward our goals of 15 Carrier Battle Groups, four Battleship Surface Action Groups (SAGs), 100 Nuclear Attack Submarines, Amphibious Lift for a MAF (AE) plus MAB (AE) and the Mine Warfare and Mobile Logistic Support Forces required to support their operations. This year we are requesting funds for the construction of twenty-three ships and the conversion or reactivation of six more.

NAVY FIVE YEAR SCN PLAN
FISCAL YEAR 1985-1989
CONGRESSIONAL SUBMISSION

	FY-85	FY-86	FY-87	FY-88	FY-89
TRIDENT	1/1755.0	1/1843.3	1/1907.4	1/1993.9	1/2133.1
SSN-688	4/2880.0	4/2873.7	4/2930.6	4/3177.4	4/3404.6
NEW DESIGN SSN	-	-	456.9	200.1	1/1715.1
CV SLEP	1/764.5	128.7	1/740.7	152.0	110.6
CG-47	3/3150.0	3/3251.7	3/3377.8	2/2500.3	2/2644.4
DDG-51	1/1173.4	279.1	3/3058.0	5/4556.0	5/4719.2
BB REACT	1/422.6	90.0	1/462.2	-	-
LSD-41	2/489.5	2/519.0	2/512.4	-	-
LHD-1	39.2	1/1365.5	124.7	1/1460.7	1/1533.5
LPDX	-	-	-	2/824.4	2/872.4
LPD-4 SLEP	15.0	94.1	1/299.6	3/816.3	3/884.5
MCM	4/349.5	4/388.0	1/99.8	-	-
MSH	-	4/234.3	4/214.2	4/240.5	4/234.6
AE	-	1/500.0	1/415.6	1/407.3	1/411.9
AG	-	1/69.4	-	-	-
AO (JUMBO)	-	-	-	1/48.5	2/96.9
AOE	-	1/815.0	-	1/679.4	1/702.7
AR	-	-	-	-	1/531.9
TACS	2/44.0	-	-	-	-
TAGM (CONV)	-	46.9	1/148.7	-	-
TAGOS	3/192.9	3/189.7	-	-	-
TAGS	2/245.0	-	-	-	-
TAK (FBM)	1/91.1	-	-	-	-
TAO	3/562.6	3/577.9	3/653.4	3/666.0	2/468.2
TAVB	1/42.8	1/32.5	-	-	-
LCAC	(9)230.1	(12)317.1	(12)329.5	(12)308.2	(12)328.9
LANDING CRAFT	11.9	37.9	70.1	73.7	38.8
SERVICE CRAFT	81.2	105.4	130.6	156.3	144.4
STRAT SEALIFT	31.0	31.0	37.0	39.0	38.0
OUTFITTING	204.4	195.9	229.9	331.7	332.7
POST DELIVERY	179.2	117.8	200.1	134.8	254.4
POTEN COST GROWTH	187.0	-	-	-	-
TOTAL	**13,141.8**	**14,103.9**	**16,449.2**	**18,758.5**	**21,800.8**
SHIP COUNT	**23/6**	**27/2**	**22/4**	**24/4**	**25/5**

TRIDENT SSBN

The TRIDENT program continued its successful record throughout the past year. Since I last appeared before this committee, the USS FLORIDA and USS GEORGIA have been delivered to the Navy and the second ship of the class, USS MICHIGAN, has joined USS OHIO on deterrent patrols. Both FLORIDA and GEORGIA will commence their first deterrent patrols during calendar year 1984, and the fifth ship of the class, the HENRY JACKSON, will deliver in the fall. This massive addition of firepower greatly increases the throw-weight and survivability of the U.S. nuclear deterrent force.

Congress has now appropriated funds for three D-5 configured TRIDENTS, the FY 1981, 1983 and 1984 ships and the program to shift to the TRIDENT II system is proceeding on schedule.

For construction of the twelfth TRIDENT submarine in FY 1985, we are requesting $1755.0 million which includes $265.5 million in advance procurement for future ships.

Nuclear Attack Submarine - SSN-688 Class

The FY 1985 budget requests the authorization and appropriation of four of this highly successful attack submarine. This marks the first year since 1974 that as many as four have been requested. These four will be the forty-fifth through forty-eighth of the class. Of the forty-four previously appropriated by the Congress, all are under contract with twenty-seven already delivered and four more scheduled to deliver during the remainder of calendar year 1984. The FY 1985 ships of this class will contain many improvements over prior years. The VLS capability to launch ship or land attack TOMAHAWK opens to these multi-purpose ships a new dimension of warfare and makes them even more valuable assets. Additionally,

TRIDENT SUBMARINE - SSBN

Mission:

To provide an undersea strategic missile system to ensure that the United States continues to maintain a credible, survivable deterrent, independent of forseeable threats.

CHARACTERISTICS

	OFFICER	ENLISTED
CREW:	15	145

LENGTH: 560 FT

NAV DRAFT: 36 FT

PROPULSION: Nuclear

WEAPONS: 24 SLBM Missiles, Torpedoes

BEAM: 42 FT

DISPLACEMENT (SUBMERGED): 18, 700 Tons

SPEED: 20+ KTS

FUNDING REQUEST	NUMBER	COST *	BUILDER
FY 1985 PROGRAM:	1 SHIP	$1755.0 MILLION * INCLUDES ADVANCE PROCUREMENT	ELECTRIC BOAT

NUCLEAR ATTACK SUBMARINE - SSN 688

Mission:

To destroy enemy ships, primarily submarines, in order to prohibit the employment of such forces in attack and destruction of U.S. and Allied targets.

CHARACTERISTICS

			OFFICER	ENLISTED
LENGTH:	360 FT	CREW:	12	90
NAV DRAFT:	32 FT	BEAM:	33 FT	
PROPULSION:	Nuclear	DISPLACEMENT:	6,900 Tons	
WEAPONS:	Torpedoes, HARPOON, TOMAHAWK	SPEED:	20 + KTS	

FUNDING REQUEST	NUMBER	COST *	BUILDERS
FY 1985 PROGRAM	4 SHIPS	$2,880.0 MILLION * INCLUDES ADVANCE PROCUREMENT	NEWPORT NEWS ELECTRIC BOAT

added arctic capability, and improved SUBACS further improve their combat capability.

The stabilization of the class at four a year through the five year plan will lead us to improved acquisition efficiency.

This year we are requesting $2880.0 million for construction of four SSN-688 ships. This includes $617.8 million in advance procurement for FY 1986 and FY 1987 submarines.

Aircraft Carrier Service Life Extension Program - CV SLEP

Despite the adverse publicity regarding problems with boiler repairs, the initial CV SLEP ship, USS SARATOGA, was an unqualified success. We learned a great deal during the SARATOGA SLEP and those lessons are being fully utilized in the execution of the second SLEP on USS FORRESTAL which is now in progress at the Philadelphia Naval Shipyard. FORRESTAL is now approximately half way through her SLEP and will complete on schedule in May of 1985 and within estimated cost. The planning for the third SLEP ship, USS INDEPENDENCE, has already benefited from experience gained from her two predecessors. I am confident that when she enters the Philadelphia Naval Shipyard in April of 1985 we will be even more certain of successful execution.

The $764.5 million requested in the FY 1985 President's Budget represents full funding for the INDEPENDENCE SLEP and includes $181.3 million in long lead funding for the SLEP of USS KITTY HAWK in FY 1987.

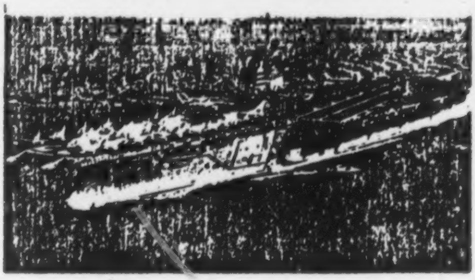
Guided Missile Cruiser - TICONDEROGA CG-47 Class

Next to the ARLEIGH BURKE destroyer, the CG-47 Class is our highest priority surface combatant. The FY 1985 budget includes a request for three ships, the fourteenth, fifteenth and sixteenth

CARRIER SERVICE LIFE EXTENSION PROGRAM-CV SLEP

Mission:

To operate aircraft and engage in attacks on targets afloat and ashore.



CHARACTERISTICS (USS INDEPENDENCE)

LENGTH:	1,070 FT
NAV DRAFT:	37 FT
CATAPULTS:	4
AIRCRAFT:	1 Carrier Air Wing, 86 POST SLEP

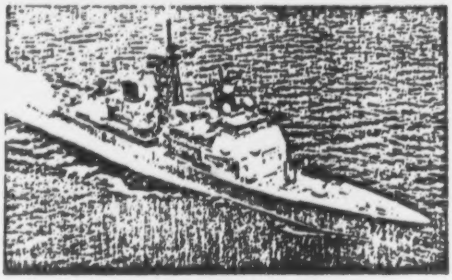
	OFFICER	ENLISTED
CREW	143	2690
BEAM:	129.5 FT	
DISPLACEMENT:	79,300 Tons	
SPEED:	30 + KTS	

FUNDING REQUEST	NUMBER	COST *	INDUSTRIAL SITE
FY 1985 PROGRAM:	1	$764.5 MILLION * INCLUDES ADVANCE PROCUREMENT	PHILADELPHIA NAVAL SHIPYARD

GUIDED MISSILE CRUISER - CG-47

Mission:

To destroy enemy aircraft, missiles, submarines and surface ships in order to prohibit the employment of such forces against U.S. forces. CG-47 class ships will normally be assigned to carrier battle groups or surface action groups.



CHARACTERISTICS

	OFFICER	ENLISTED
CREW:	33	362

LENGTH: 563 FT
NAV DRAFT: 31 FT
PROPULSION: Gas Turbine
BEAM: 55 FT
DISPLACEMENT: 9,600 Tons
SPEED: 30+KTS
WEAPONS: AEGIS Combat System, Vertical Launch System SM-2 MR, 2 5"/54 Guns, TOMAHAWK, HARPOON, TORPEDOES, Close in Weapons System (CIWS), LAMPS MK III Helicopter, AN/SLQ32 (V3). SRDC

FUNDING REQUEST	NUMBER	COST *	BUILDER
FY 1985 PROGRAM:	3 SHIPS	$3150.0 MILLION * INCLUDES ADVANCE PROCUREMENT	INGALLS BATH IRON WORKS

ships of the class. The first ship of the class, USS TICONDEROGA (CG-47) was authorized and funded in the FY-1978 budget and deployed in October 1983, only nine months after commissioning. She is now in the Eastern Mediterranean with the Navy Task Force supporting U.S. Marines in Lebanon and providing an "air picture" of unprecedented quality. TICONDEROGA has seen action in this volatile region, her 5"/54 guns having taken hostile targets under fire. YORKTOWN, (CG-48), has been launched and was christened 16 April 1983. She will commission in July 1984. CG-49, recently named VINCENNES, was launched 14 January and will be christened in April.

The AEGIS Combat System installed in the CG 47 class Cruiser includes the most sophisticated anti-air warfare system in the world. It is designed to counter the full spectrum of anti-ship cruise missile threats. It provides area air defense in a high density, high threat, anti-ship missile environment. Our continuing assessment of Soviet missile launching capabilities confirms that the CG-47 class is urgently required by the fleet in numbers.

Commander, Task Force 60 in the Eastern Mediterranean is extremely upbeat about the improvement in the quality of air operations since TICONDEROGA's arrival. Alert launches of Combat Air Patrol aircraft have dropped very significantly because of the complete and accurate air picture TICONDEROGA provides, resulting in a 40% aviation fuel saving over previous deployments. CTF-60 has indicated that he and his staff are now able to concentrate on higher level operational problems rather than spending the majority of their time piecing together the air picture. Three major upgrades have been incorporated into the CG-47 class: VLS in CG-52, SQQ-89 ASW system in CG-56, and SPY-1B Radar in CG-59; each provide major capability improvements. These upgrades were approved by the Congress last year in CG-59 and are included in the ships being requested this year, and represent the configuration for the balance of the class. Another important development in this class is the competition between Ingalls Shipbuilding and Bath Iron Works. We now have two shipbuilders working and expect considerable cost savings to result from healthy competition. Competition will be continued in FY 1985 and through the balance of the class.

USS TICONDEROGA is a quality product and her addition to the fleet has added a new dimension to Battle Group AAW. In addition to her superb AAW capability, she possesses superior capability in ASW and Anti-Surface Warfare. With the advent of TOMAHAWK and Vertical Launchers in CG-52, all follow cruisers will have substantial strike warfare capability. The Navy is now in serial production of this highly capable class of ship and they are well on their way to becoming essential components of our Battle Groups. TICONDEROGA and her sister ships will enhance the Battle Group's ability to fight and survive in hostile environments. The CG-47 class may also be employed with IOWA Class battleships and other surface combatants to form potent Surface Action Groups. This year we are requesting $3150.0 million for three CG-47 class ships.

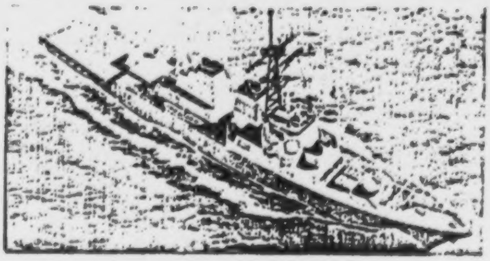
ARLEIGH BURKE Class Destroyer (DDG-51)

ARLEIGH BURKE (DDG-51) is a new general purpose, multi-mission destroyer designed to balance required warfighting capability and affordability. The DDG-51 class is our highest priority surface ship program and is urgently needed to rebuild our guided missile destroyer force. Only four guided missile destroyers have been built since the mid 1960's, the DDG-993, 994, 995 and 996 originally

GUIDED MISSILE DESTROYER - DDG 51

Mission:

To destroy enemy aircraft, missiles, submarines and surface ships. The DDG 51 will be employed as a part of a Carrier Battle Group, Surface Action Group, Underway Replenishment Group or Amphibious Group.



CHARACTERISTICS

			OFFICER	ENLISTED
		MANNING:	23	280
LENGTH:	466 FT	BEAM:	59FT	
NAV DRAFT:	30 FT	DISPLACEMENT:	< 8300TONS	
PROPULSION:	LM 2500 Gas Turbine	SPEED:	30 + KTS	

WEAPONS: AEGIS Weapon System, Vertical Launch System, TOMAHAWK, SM-2 MR, VLA, SEAFIRE/GUIDED PROJECTILE, HARPOON, Torpedoes, (1) 5"/54 gun, SQS/53C SONAR, AN/SQR 19 TACTAS; CIWS (2), SLQ 32 (V) 2/SUPER RBOC, LAMPS MKIII ELECTRONICS

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM:	1	$1173.4 MILLION	TBD

designed for Iran and now a part of our fleet. These ships are needed to operate with Amphibious Task Forces, Surface Action Groups, and Underway Replenishment Groups as well as Carrier Battle Groups. The FY 1985 Budget includes a request for the lead ship of the class which will commission in July 1989.

ARLEIGH BURKE's state-of-the-art AEGIS Combat System is heir to the Combat System developed for and successfully employed in USS TICONDEROGA (CG-47). It has been down-sized to meet destroyer requirements, and includes system upgrades in computers, displays, gun control and sonar. ARLEIGH BURKE will further distribute the AAW capabilities of CG-47's and the ASW capabilities of DD-963's. In addition, she continues the introduction of significant surface combatant strike capabilities with her vertically-launched TOMAHAWK Cruise Missiles.

The AEGIS/SPY-1D Phased Array Radar is the core of the AAW Weapon System, providing quantum improvements over older guided missile destroyers in detection, range, reaction time, firepower, availability and area coverage. The radar provides mid-course guidance to vertically-launched STANDARD Surface-to-Air Missiles, and fire control quality data to the 5"/54 gun. The ship's AAW suite is complete with two PHALANX Close-In Weapon Systems to engage short range penetrators and sea skimmers. These elements ensure high firepower and fast reaction time to meet the projected threat in the 1990's and beyond.

The ship's Anti-submarine Warfare system includes two advanced sensors, the AN/SQS-53C hull-mounted sonar and AN/SQR-19 Towed Array Sonar for long range detection and classification. These equipments represent the very best available in active and passive acoustic sensors. The ASW weapons are vertically-launched extended range anti-submarine rockets and torpedoes launched from the two deck mounted MK-32 torpedo tube groups. The flight deck is equipped for LAMPS MK-III helicopters and the LAMPS MK-III shipboard electronics will be installed in the ship.

Strike Warfare capability, including TOMAHAWK and HARPOON Missiles, is a major feature of ARLEIGH BURKE's offensive warfighting ability. These capabilities have never before been designed into a destroyer. Vertically-launched TOMAHAWK Cruise Missiles, programmed onboard, can be fired with great accuracy at long range against both land targets and ships. Further, the ship will carry canister-launched HARPOON Missiles for anti-surface operations. These missiles, with the SEAFIRE Gun Fire Control systems and laser guided projectiles, give DDG-51 a formidable strike capability.

DDG-51's hull is a new design, with survivability and seakeeping greatly improved over any previous destroyer. With a greater beam-to-length ratio than DD-963's, more room is provided within the hull for vital combat system equipment and protected control centers. Steel is used throughout the hull and in all vital superstructure areas, providing fragmentation protection and increased resistance to blast overpressure and fire damage. Electromagnetic pulse protection is designed into major electronics equipment. A Collective Protection System defends all vital areas against chemical, biological and radiological hazards.

The propulsion train is the proven and reliable system installed in the CG-47 class, including a three generator gas turbine drive electrical plant. The Rankine Cycle Energy Recovery (RACER) System, currently under development, will be added to the class when fully developed and tested for operational suitability and cost effectiveness.

The request for this year is $1173.4 million for the first ship - ARLEIGH BURKE. $79.0 million in advance procurement for this ship was appropriated by the Congress in FY 1984. ARLEIGH BURKE was approved for detailed design and construction by the Defense System Acquisition Review Council in September 1983. We will complete Contract Design in-house in June 1984 with shipbuilders, weapons system and combat system engineers as members of the design team.

ARLEIGH BURKE will join the fleet in 1989, the first of the most modern and effective destroyers in the world. She will be flexible, hardy, lethal, and fully effective across all mission areas and I cannot overemphasize the importance of getting this class started.

Battleship Reactivation

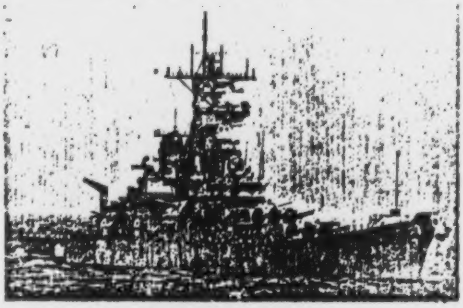
This year the President's Budget requests full funding for the reactivation of the MISSOURI. In FY 1984 Congress approved $57.7 million in long lead funding for this ship. The reactivation is scheduled to be accomplished at the Long Beach Naval Shipyard which did such a superb job on USS NEW JERSEY.

As we request full funding for reactivation of the third Battleship, IOWA is nearing completion of her industrial period at Ingalls Shipbuilding in Pascagoula Mississippi. With the concurrence of the Congress, a reprogramming of funds has permitted acceleration of IOWA which will permit her to relieve USS NEW JERSEY in July. This deployment will be a year earlier than originally planned.

BATTLESHIP REACTIVATION - BB(R)

Mission:

To conduct prompt and sustained combat operations at sea, worldwide, in support of national interests.



CHARACTERISTICS

	OFFICER	ENLISTED
CREW:	66	1471

LENGTH: 887 FT
NAV DRAFT: 38 FT
PROPULSION: STEAM

BEAM: 108 FT
DISPLACEMENT: 58,000 TONS
SPEED: 30 + KTS

WEAPONS: 9 16 Inch guns, 12 5 inch guns, 32 TOMAHAWK, 16 HARPOON, 4 Close in Weapons Systems (CIWS)

FUNDING REQUEST	NUMBER	COST	INDUSTRIAL SITE
FY 1985 PROGRAM:	1	$422.6 MILLION	LONG BEACH NAVAL SHIP YARD

This year we are requesting $422.6 million for the reactivation of MISSOURI.

Landing Ship Dock - LSD-41

In FY 1984 Congress approved the President's request for a five ship, three year multi-year procurement with certain conditions. In lieu of a multi-year contract, the Department of the Navy offered to industry a proposal for one ship in FY 1984 with priced options for additional ships in FY 1985 and FY 1986. The competition for this contract was intense and resulted in large procurement savings.

The two ships requested in FY 1985 represent the fifth and sixth ships of the LSD-41 class. The lead ship, under construction by Lockheed Shipbuilding in Seattle, Washington, is proceeding on schedule and will deliver in November 1984.

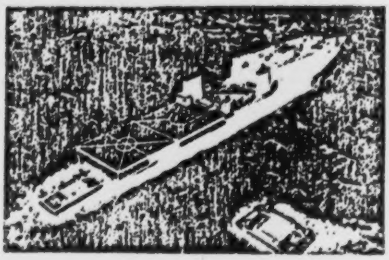
The options with Avondale for up to four more ships through FY 1986 and those now under construction will give us eight ships of the LSD-41 class. While the five year plan shows construction of a ninth and tenth LSD-41 in FY 1987, we expect to shift to a variant of the LSD-41 in FY 1987 which would have additional cargo lift capability and reduced well deck space. This is the ship represented in the five year plan as the LPDX. If our ongoing studies prove the feasibility of the concept, we will request a change over to the LSD-49 class (variant) in FY 1987 and stop the LSD-41 line at eight ships which is the absolute minimum of that class needed to support Marine lift requirements.

This year we are requesting a total of $489.5 million for the LSD-41 program which includes $83.5 million in advance procurement for the FY 1986 ships.

LANDING SHIP DOCK - LSD-41

Mission:

To transport and launch loaded amphibious craft and vehicles with their crews and embarked personnel in amphibious assault operations.



CHARACTERISTICS

LENGTH:	609 FT
NAV DRAFT:	19.5 FT
PROPULSION:	DIESEL
SPEED:	20+KTS

	OFFICER	ENLISTED
CREW	18	337
BEAM:	84 FT	
TROOP LIFT:	504*	
LCAC:	4	
FULL LOAD DISPLACEMENT:	15,745 Tons	

* 338 Troops plus 102 surge capacity; 64 assault craft unit accommodations.

FUNDING REQUEST	NUMBER	COST *	BUILDER
FY 1985 PROGRAM:	2 SHIPS	$489.5 MILLION * INCLUDES ADVANCE PROCUREMENT	AVONDALE

Amphibious Assault Ship - LHD-1 Class

In FY 1984, Congress appropriated full funding for the lead ship of the LHD class. These ships have a large capacity to lift troops and equipment and are the centerpiece of the Department of the Navy plan to expand our Marine Corps lift capability. It is designed to be convertible to sea control and power projection roles if released from its primary amphibious mission.

This year we are requesting long lead funding in the amount of $39.2 million for the second ship of the class which is planned for FY 1986.

LPD-4 SLEP

The Navy has determined that without a service life extension program for the LPD-4 class, we will be unable to achieve our lift goals through the 1990s. The LPD-4 class is approaching the mid point of the traditional thirty year service life for Navy ships. The LPD-4 class ships are still in good material condition and are excellent candidates for a fifteen year service life extension.

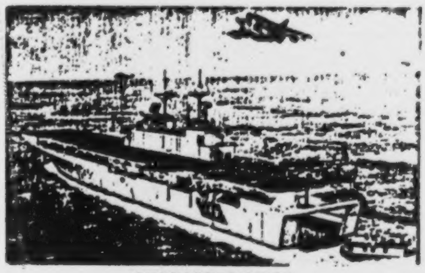
The Navy considers this a prudent and highly effective method to ensure adequate lift for the future. The first LPD-4 SLEP is planned for the private sector in FY 1987. The SLEP will provide improved survivability and engineering plant modernization as well as self protection systems such as CIWS, SRBOC and SLQ-32 systems. Additionally, the LPD-4 class will receive well deck modifications to operate one LCAC.

This year we are requesting $15.0 million for long lead material for the LPD-4 service life extension program.

AMPHIBIOUS ASSAULT SHIP - LHD 1

Mission:

To embark, deploy and land elements of a major Marine landing force in an assault by helicopters, VSTOL aircraft, landing craft and amphibious vehicles. The LHD class may be converted to operate AV-8s in the attack role.



CHARACTERISTICS

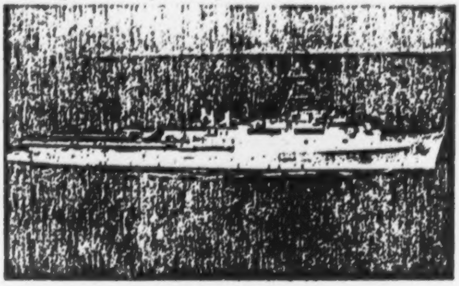
			OFFICER	ENLISTED
LENGTH:	844 FT	CREW: INCLUDES CATF AND STAFF	98	982
NAV DRAFT:	26 FT 8 IN	BEAM:	106 FT	
PROPULSION:	STEAM	FULL LOAD DISPLACEMENT:	40,600 Tons	
TROOP CAPACITY:	1,873	SPEED:	20+KTS	
HELICOPTER CAPACITY	42 CH-46 equivalents	LCAC:	3	

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM	LONG LEAD	$39.2 MILLION	INGALLS

AMPHIBIOUS SERVICE LIFE EXTENSION PROGRAM
LPD 4 SLEP

Mission:

To transport and land troops and their essential equipment and supplies by means of embarked landing craft or amphibious vehicles augmented by helicopter lift.



CHARACTERISTICS

					OFFICER	ENLISTED
LENGTH:	570 FT			CREW:	24	373
NAV DRAFT:	23 FT			BEAM:		106 FT
PROPULSION:	STEAM			DISPLACEMENT:		16,700 Tons
TROOPS:	930	HELICOPTERS:	4	SPEED:		20 + KTS
				LCAC:		1*

* After SLEP

FUNDING REQUEST	COST	INDUSTRIAL SITE
FY 1985 PROGRAM:	$15.0 MILLION (Advance Procurement)	TBD

Mine Countermeasures Ship - MCM-1 Class

To date, Congress has appropriated five ships of the MCM-1 class. The lead ship appropriated in FY 1982 is under construction at Peterson Shipbuilding and the FY 1983 ship at Marinette Marine. Contracts for two of the three FY 1984 ships were awarded to Peterson with Marinette receiving an award for the remaining ship. The lead ship is on schedule and will deliver in September 1985. The design problems which surfaced last year have been satisfactorily resolved without impact on end cost. The difficulties we have experienced in integrating the Precise Integrated Navigation System (PINS) are being resolved and PINS will be fully ready when the lead ship delivers. The pressing requirement for delivery of these ships to the Fleet cannot be overstated. This year we are requesting four MCMs, the sixth through the ninth of the fourteen ship class at a total cost of $349.5 million.

Auxiliary Crane Ship - TACS

The TACS system involves the conversion of selected container ships through the installation of cranes, supplementary crew accommodations and enhanced break-bulk cargo stowage. These ships are designed to provide unloading services to non-self sustaining container ships and other ships alongside. It will also carry unit equipment, heavy break bulk cargo and offload lighterage.

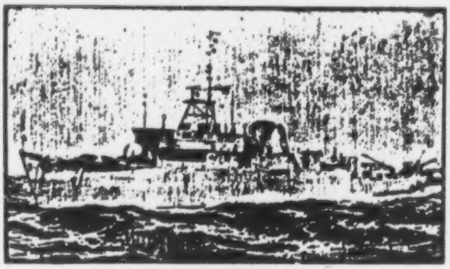
TACS will be maintained in a high degree of readiness in the Ready Reserve Force (RRF). When activated, the ships will be crewed by merchant seamen and operated by the Military Sealift Command.

Congress has previously appropriated funds for two of these conversions in other accounts. The first will deliver this summer. Seven additional conversions are required after FY 1985 and will

MINE COUNTERMEASURES SHIP - MCM 1

Mission:

To hunt, neutralize and sweep mines in CONUS waters, choke points and overseas areas.



CHARACTERISTICS

			OFFICER	ENLISTED
		CREW:	5	67
LENGTH:	224 FT	BEAM:		39 FT
NAV DRAFT:	11.4 FT	SPEED:		13.5 KTS
PROPULSION:	DIESEL	HULL:		Wood/GRP

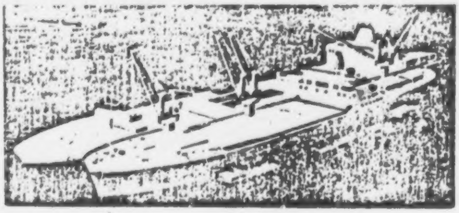
EQUIPMENT: Mine Hunting Sonar SQQ-30, Mine Neutralization System (MNS), Standard mechanical sweep gear Precise Integrated Navigation System (PINS AN/SSN-2)

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM:	4 SHIPS	$349.5 MILLION	PETERSON MARINETTE MARINE

AUXILIARY CRANE SHIP: TACS

Mission:

These ships, with their permanently installed heavy lift cranes, are capable of self-unloading heavy cargo and unloading non-self-sustaining container ships and other ships alongside. The TACS ships will be maintained in a high degree of readiness in an inactive status either in the continental United States or stationed in a forward area. When activated, the ships will be crewed by merchant seamen and will be operated by Military Sealift Command (MSC).



CHARACTERISTICS

			OFFFICER	ENLISTED
LENGTH:	669 FT	CREW: MSC	18	71
DRAFT:	33 FT			
SPEED:	20 KTS	DISPLACEMENT:	31,500 Tons	
BEAM:	76 FT			
PROPULSION:	STEAM			

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM	2	$ 44.0M	TBD

be funded in the SCN account. Due to the late transfer of these outyear ships to SCN, they are not included in the FY 1986 - FY 1989 programs. This will be rectified during the FY 1986 budget submission.

For FY 1985, we are requesting $44.0 million for two TACS.

Ocean Surveillance Ship - TAGOS

From 1979 to 1982 the Congress appropriated 12 monohull TAGOS ships. These ships were all awarded to TACOMA Boat Corporation and are under construction at that yard. The six additional TAGOS requested in the five year plan permit the Navy to move closer to our TAGOS requirement of twenty-four. These six will be repeat construction of the first twelve and like those ships will be crewed by civilian contract mariners.

This year the President's budget request is for $192.9 million for three ships.

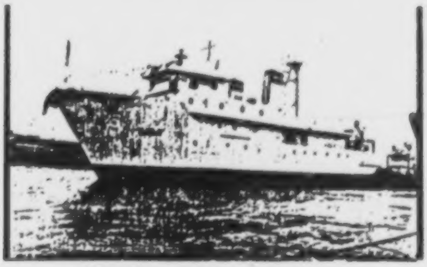
Ocean Survey Ship - TAGS

Up until November 1983, Navy was proceeding to refurbish two twenty year old merchant ships currently in the Ready Reserve Force for the TAGS mission. Based on Congressional direction and greatly improved marketplace conditions, we have moved to a new construction option for FY 1985. These ships will be competitively designed and built by industry in the same type of acquisition program being successfully utilized in the MSH program. The estimated cost for these two new ships is only slightly more than that requested for the previously considered conversion alternative. This is due in large measure to our estimate of the intense competition which will exist for these ships from many of the nations shipbuilders.

OCEAN SURVEILLANCE SHIP: TAGOS

Mission:

As a unit of the Military Sealift Command, to collect, process, and transmit acoustic data.



CHARACTERISTICS:

	OFFICER	ENLISTED	TECHNICIANS
CREW:	8	11	7

LENGTH: 226 FT
NAV DRAFT: 15 FT
PROPULSION: DC ELECTRIC MOTOR DRIVE

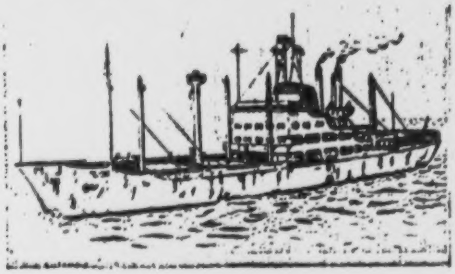
BEAM: 43 FT
DISPLACEMENT: 1980 TONS
SPEED: 11 KTS

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM	3 SHIPS	$192.9 MILLION	TBD

OCEAN SURVEY SHIP - TAGS

Mission:

Ocean Survey Ships are designed to conduct Ocean Survey in direct support of the Submarine Launched Ballistic Missile (SLBM) Program.



CHARACTERISTICS

These new construction ocean survey ships will be designed by industry to meet Navy requirements. Specifications will allow for innovative design to satisfy the survey mission.

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM:	2	$245.0 MILLION	TBD

These new ocean survey ships are urgently required to replace the USNS BOWDITCH and USNS DUTTON which are over forty years of age and have become difficult to maintain.

For the construction of two TAGS, we are requesting $245.0 million in FY 1985.

Missile Resupply Ship - TAK-FBM

Last year the Congress appropriated advance procurement funding for the conversion of a TAK-FBM in FY 1985. These ships provide the primary logistics link between CONUS and advance FBM sites.

This ship, when delivered in FY 1987, will replace the USNS MARSHFIELD (TAK-282). In concert with the decision to build the Ocean Survey Ships as new construction ships, the Navy also examined the feasibility of a new construction TAK vice the planned conversion. Since the TAK requirement will expire in the late 1990s when we achieve an all TRIDENT force, no justification for new construction could be substantiated and conversion of an existing merchant hull remains the most cost effective method to fulfill the requirement.

This year we are requesting $91.1 million for full funding of the TAK-FBM ship.

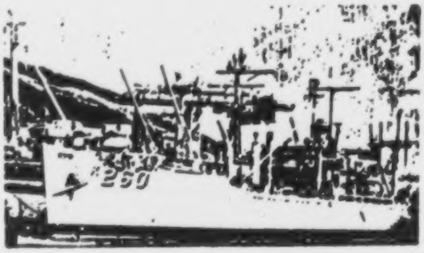
Fleet Oiler - TAO-187 Class

After one ship a year was appropriated in FY 1982 and FY 1983, last year's appropriation was for two TAOs. All design and cost issues have long since been resolved and the TAO construction program is now a well defined mature acquisition effort. The first four of the class are all being built at Avondale. That initial multi-ship option contract ended with the FY 1984 ships. Now that we are moving toward series production of three ships per year we

MISSILE RESUPPLY SHIP : TAK (FBM)

Mission:

Provides Resupply service to Strategic Submarine tenders at Holy Loch Scotland, Charleston, S.C. and Kings Bay, Ga.



CHARACTERISTICS (Conversion of C3 Hull)

		CREW:	67 MSC MARINERS 7 NAVY COMMUNICATORS
LENGTH:	483 FT		
SPEED:	18 KTS	BEAM:	68 FT
PROPULSION:	STEAM	DISPLACEMENT:	15,977 Tons

FUNDING REQUEST	NUMBER	COST	INDUSTRIAL SITE
FY 1985 PROGRAM:	1	$91.9 MILLION	TBD

FLEET OILER TAO 187

Mission:

To provide rapid replenishment of petroleum products to operating forces at sea.

CHARACTERISTICS

LENGTH:	677.5 FT	CREW:	95 MSC/21 USN
NAV DRAFT:	35.0 FT	BEAM:	97.5 FT
SPEED:	20 KT Sustained	CAPACITY:	180,000 Barrels
PROPULSION:	Medium Speed Diesel		

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM	3 SHIPS	$562.6 MILLION	TBD

intend to award the three 1985 TAO to one builder with options for up to three more in FY 1986 and FY 1987. We have proven with the FY 1984 LSD-41 program the savings which can be achieved by competition and we believe that we can achieve similiar savings with this multi-ship initiative. These ships are urgently required to redress fleet oiler shortfalls and replace our overage oiler force.

This year we are requesting $562.6 million for the fifth through seventh TAO-187.

Aviation Logistics Support Ship - TAVB

This program will modify two government owned Sea Bridge class (C5-3-78a) ships to enable them to load the vans and equipment of a Marine Aviation Intermediate Maintenance Activity (IMA), and transport them to the desired in theater location. These ships have a combination Roll on/Roll off (RO/RO) and self sustaining container ship configuration which will permit them to self-offload alongside a pier or from offshore.

The FY 1985 President's budget requests $42.8 million for the first of the two ships. This figure includes $5.2 million in long lead material for the second ship in FY 1986.

Landing Craft Air Cushion - LCAC

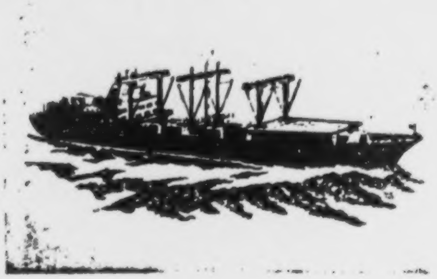
The LCAC is a high speed amphibious craft capable of lifting heavy equipment, weapons systems, cargo and personnel across the beach from amphibious ships at sea well offshore from the assault area. Since LCAC are not restricted by surf or beach conditions, it opens a much larger area of the world's coastline to rapid amphibious assault.

FY 1985 will be the fourth year of LCAC production. To date twelve craft have been appropriated and the first two will deliver

AVIATION LOGISTICS SUPPORT SHIP: TAVB

Mission:

To provide dedicated sealift for movement of a functional aviation Intermediate Maintenance Activity (IMA) to support rapid deployment of USMC fixed and rotary wing aircraft.



CHARACTERISTICS

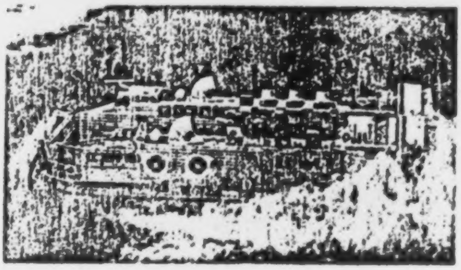
			OFFICER	ENLISTED
LENGTH:	602 FT	CREW:	2	39
DRAFT:	29.8 FT	BEAM:		90 FT
PROPULSION	STEAM	DISPLACEMENT:		23,872 LT
SPEED:	20 + KNOTS			

FUNDING REQUEST	NUMBER	COST *	INDUSTRIAL SITE
FY 1985 PROGRAM	1	$42.8M * INCLUDES ADVANCE PROCUREMENT	TBD

LANDING CRAFT AIR CUSHION - LCAC

Mission:

The LCAC program has been established to transport weapon systems, equipment, cargo, and personnel of the assault elements of the Marine Air/Ground Task Force from ship to shore and across the beach.



CHARACTERISTICS

LENGTH:	87 FT 11 IN
BEAM:	47 FT
PROPULSION	GAS TURBINE
CARGO DECK AREA:	1,809 SQ FT

	ENLISTED
CREW:	5
DESIGN PAYLOAD:	60 Tons
OVERLOAD PAYLOAD:	75 Tons
SPEED:	40 KTS with payload
RANGE:	200 NM with payload

OPERATOR
ENGINEER
NAVIGATOR
LOAD MASTER
DECK HAND
ENGINEER

FUNDING REQUEST	NUMBER	COST	BUILDER
FY 1985 PROGRAM:	9 CRAFT	$230.1 MILLION INCLUDES ADVANCE PROCUREMENT	BELL AEROSPACE/TEXTRON

by March of next year. As you know, the well decks of the LSD-41 and LHD-1 classes have been sized to optimize LCAC fit and operational envelopes. Based on the latest joint Navy Marine Corps studies, our requirement for LCAC is now 90 craft.

This year Navy is requesting $230.1 million for nine craft which includes $31.3 million in advance procurement for future production.

Craft

The FY 1985 request includes $81.2 million for service craft and $11.9 million for conventional landing craft. The request includes $26.4M for six YTBs. This program builds replacements for YTMs constructed during World War II which are still in service. The seven YPs at $26.1 million represent the fourth year of production for this training craft for the U. S. Naval Academy. The YPs which are replaced will be utilized for officer training at the Surface Warfare Officers School at Coronado California, others will be assigned to Naval Reserve Units around the country to be utilized as training platforms for the mine warfare "Craft of Opportunity" (COOP) program. The three YDs (floating cranes) for $19.2 million are part of a program required to replace World War II inventory cranes and to provide for new requirements at Holy Loch and Diego Garcia. The YC and YFN requirements are to replace barges built before and during World War II.

The landing craft requested in the FY 1985 budget are designed to provide training for the following Naval Reserve Units:

2 LCU - 1 - LCU DET 110, Orange, Texas
1 - LCU DET 205, Buffalo, N.Y.
3 LCM-8 - 3 - LCM DET 1613 Great Lakes

CRAFT

PROGRAM	QUANTITY	FUNDING
LCM-8	3	$ 1.9M
LCM-6	2	$ 1.3M
LCU	2	$ 8.7M
YTB	6	$ 26.4M
YP	7	$ 26.1M
YD	3	$ 19.2M
YC	10	$ 5.0M
YFN	6	$ 4.5M

2 LCM-6 - 2 - LCM DET 2605 Cleveland, Ohio

This is part of a continuing Navy program to upgrade equipment utilized by the Naval Reserve units around the country.

Strategic Sealift

The $31.0 million requested in the FY 1985 President's Budget will fund the purchase from the U.S. Maritime industry of cargo ships and tankers which are no longer commercially viable. These ships will be inducted into the Ready Reserve Force (RRF), a portion of the National Defense Reserve Fleet (NDFR) and will be available to support world wide operations on a short notice basis. No quantity of ships is specified since the purchase price is a dynamic combination of availability, condition of the ship and scrap market values.

Outfitting/Post Delivery

Outfitting material consists of Government Furnished repair parts and other material, including stock fund items and general use consumables required to fill a ship's initial allowance of storeroom and operating space items. This year the request for outfitting is $204.4 million. Post Delivery funding of $179.2 million is requested in the FY 1985 budget submission. This funds all work including related design, planning, and procurement of government furnished material (GFM) required for correction of defects or deficiencies identified during trials or the post delivery period. The requirement is based on the number and mix of ship types delivering during the fiscal year.

OTHER SHIPBUILDING

	FY 1985
OUTFITTING	$204.4M
POST DELIVERY	$179.2M
STRATEGIC SEALIFT	$ 31.0M
POTENTIAL COST GROWTH	$187.0M
NET FUNDING REQUIREMENT	$601.6 M

Potential Cost Growth

In order to ensure that all programs are fully funded thoughout the building period, money is requested to cover potential cost growth which may occur in the future. A total of $187.0 million is requested for this purpose.

Mr. Chairman, that concludes my presentation. I appreciate this opportunity to present the Navy's shipbuilding plan for fiscal year 1985 and I hope that this material will be helpful as you begin your deliberations on the FY 1985 DoD Authorization Bill. I am aware of the continuing interest and support of this committee for a strong Navy and I respectfully solicit a continuation of that support.

PREPARED STATEMENT OF VICE ADM. ROBERT L. WALTERS, U.S. NAVY, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SURFACE WARFARE

FISCAL YEAR 1985 WEAPONS PROCUREMENT, NAVY

Mr. Chairman and distinguished members of the Subcommittee, it is my privilege to appear before you to present the munitions requirements for the U.S. Navy contained in the Weapons Procurement, Navy appropriation fiscal year 1985 Budget Request and those items which require authorization in fiscal year 1986.

The Weapons Procurement, Navy appropriation is composed of four budget activities. Activity One includes procurement of ballistic missiles and navigation satellite systems. Activity Two includes other missiles such as air-to-air, surface-to-air, air-to-ground and cruise missiles as well as aerial targets for testing and training. Activity Three includes torpedoes, mines and subsurface training targets. Activity Four consists of naval guns, small arms and associated support equipment. Each of the four activities also includes funds for modifications of associated weapons or missiles, spare parts and necessary tooling and industrial facilities to support assembly, checkout and maintenance of in-service weapons.

When discussing the Weapons Procurement, Navy Appropriation, I would like to emphasize that it primarily funds the technologically complex weapons used against major targets such as ships, aircraft and submarines which are expensive for the enemy to procure, are relatively small in numbers, and cannot be easily regenerated. These sophisticated weapons are called "Threat" weapons by the Navy and include all air-to-air missiles, surface-to-air missiles, cruise missiles, torpedoes and some mines. At the same time, this appropriation contains a limited number of "Level of

Effort" munitions used against the kinds of targets which are far more cheaply and rapidly constructed and therefore more numerous such as tanks, bunkers, air defense systems and battlefield command and control installations. Moreover, while the Weapons Procurement, Navy Appropriation funds guns and small arms, the ammunition for them, along with the majority of Level of Effort ordnance, are procured through the Other Procurement, Navy Appropriation.

The inventory objectives which determine procurement requirements for all weapons are reviewed annually within the Navy by means of the Non-Nuclear Ordnance Requirements process. Consideration is given to a number of variables which relate to the quantity of weapons necessary to counter the enemy threat, including the following:

- Estimated enemy order of battle and defensive capabilities
- Our own demonstrated weapons system capabilities
- The anticipated scenarios
- Logistic requirements including weapon distribution to fighting units
- Battle attrition on both sides.

With these factors as inputs, computer models are used to assess the adequacy of varying quantities of ordnance. Separate models within the system have been developed for Threat weapons and the various categories of Level of Effort munitions. Finally, the results provided from the computer models are analyzed by experienced operational and logistics personnel. This process determines inventory requirements for warfighting sustainability levels.

This year's budget request seeks appropriations for an increment of weapons which will support steady progress toward attainment of inventory objectives in balance with overall fiscal realities. To put our current status in perspective, it is useful to recall that for most of the 1970's, the Navy was not funded to procure sufficient quantities of ordnance. In fact, inventories declined in many categories since appropriations were not adequate to fully replenish ammunition used operationally for training and testing. Chronic underfunding had particular impact on sophisticated weapons such as missiles and antisubmarine ordnance. By the early 1980's, the Navy was unable to fully meet shipfill requirements for combatant ships and air wings, and crossdecking of ordnance between returning and outward bound deployers became commonplace. Although procurement levels have increased markedly since 1980, the shortages resulting from years of decline cannot be eliminated within a few years. Our program to replenish weapons inventories must reflect increases in production rates which are both attainable by contractors and consistent with budget realities.

In fact, we are making steady progress toward our sustainability goals. The weapons funded in earlier years began reaching the fleet in fiscal years 1982 and 1983. Moreover, the expanded production levels which Congress has funded in recent years have led to reductions in unit costs of both missiles and ammunition, allowing us to procure larger quantities. With full funding of the weapons segment of the Five Year Defense Plan, we expect to attain prudent ordnance inventories by 1989. With that goal in mind, the fiscal year 1985 WPN request totals $4.651 billion, reflecting an increase of 25% over current year 1984 funding of $3.77 billion.

I will now briefly discuss the individual programs of the appropriation in order of budget activity.

BUDGET ACTIVITY I

BALLISTIC MISSILES

POSEIDON

Although POSEIDON missiles are no longer being procured, funding is requested to support missile tests required throughout the operational lives of the weapons to evaluate the readiness of deployed missiles in accordance with Joint Chiefs of Staff criteria. The fiscal year 1985 budget includes funds for special purpose flight test instrumentation components and Department of Defense components delivered to the Department of Energy for POSEIDON warhead assembly. $5.5 million is requested for POSEIDON for fiscal year 1985.

TRIDENT

The fiscal year 1984 procurement of 52 missiles marked the final procurement of the TRIDENT I missile. For fiscal year 1985, $163.8 million is requested for continuing procurement of reentry body components and test instrumentation required to support follow on flight testing similar to that described for the POSEIDON missile.

Fiscal year 1985 represents the initial year of funding in support of the TRIDENT II missile. This missile is characterized by greater range, increased payload capability and improved accuracy. Fiscal year 1985 and subsequent funding will support an initial operating capability of 1989. TRIDENT II is planned for installation in all OHIO class submarines commencing with the ship funded in FY 1981 and will be backfitted in all earlier ships during their first overhaul. Pre-production funds of $162.9 million in fiscal year 1985 are requested for planning, initial outfitting of industrial facilities and procurement of reentry systems.

MODIFICATION OF MISSILES

Missile modifications are determined only after thorough investigation has established the need for a change in system or equipment configuration, the total estimated cost and the impact of a proposed change have been defined and the proposal intensely screened to determine a positive advantage to the system. The fiscal year 1985 request for modifications of POSEIDON missiles is $25.2 million.

SUPPORT EQUIPMENT AND FACILITIES

The support funds requested in Budget Activity I are for initial and replenishment spares and repair parts, maintenance of missile industrial facilities and astronautics. The fiscal year 1985 request for support equipment and facilities is $22.4 million.

BUDGET ACTIVITY II

OTHER MISSILES

TOMAHAWK

The TOMAHAWK Cruise Missile is a long range missile with land attack and anti-ship variants, sized to fit submarine torpedo tubes and surface ship launchers. TOMAHAWK can be deployed from a variety of subsurface and surface platforms and will markedly expand the fleet's offensive firepower capability. In the FY-85 shipbuilding program, TOMAHAWK capability will be provided in all cruisers, destroyers and attack submarines. The anti-ship version uses a modified HARPOON guidance system and the land attack version has inertial and terrain contour matching guidance system. The land attack version can be fitted with either a high explosive or nuclear warhead.

The Fiscal Year 1984 Authorization Act expressed concern that the Navy had not clearly formulated or articulated its strategic planning and concept of operations for the employment of TOMAHAWK Land Attack Nuclear Cruise Missiles aboard surface ships and directed that the Navy submit a report defining its plans for the use of TLAM-N aboard surface ships. This report was forwarded in January of this year.

One year ago, a comprehensive restructure of the TOMAHAWK program was initiated by the Director, Joint Cruise Missiles Project. Since that time, TOMAHAWK has experienced a significantly improved flight test record. Of 22 missile flights, only two reliability failures have been recorded. One additional unsuccessful flight was a weapon control system malfunction and not considered valid for test purposes. Operational evaluation of the anti-ship TOMAHAWK was completed in October 1983 with fleet introduction in November 1983 aboard USS ATLANTA. Operational evaluation of Nuclear Land Attack TOMAHAWK was also completed in October 1983 with fleet introduction scheduled for June 1984.

For Fiscal Year 1985, a total of $560.1 million is requested to fund the procurement of 180 TOMAHAWK missiles and to provide procurement of long lead time materials for the fiscal 1986 procurement.

HARPOON

The HARPOON Cruise Missile is designed to provide a ship, air and submarine launched all-weather anti-ship weapon effective against enemy surface combatants and merchant shipping.

HARPOON continues to be one of the Navy's highest performance weapons. Free flight missile reliability for all production missile firings to date is in excess of 90%. To provide adequate numbers of this highly reliable and effective weapon to the fleet, the Navy requests $327.1M for 354 missiles in FY-85.

AIR-TO-AIR MISSILES

SPARROW

The AIM/RIM-7M SPARROW III is a semi-active medium range intercept missile and is employed by Navy F-4, F-14 and F/A-18 fighter aircraft and surface ships having the NATO SEA SPARROW missile system. The AIM-7M and RIM-7M missiles are nearly identical except for the folding wings, clipped fins and remote arming capability of the RIM-7M surface-to-air missile. Compared to its immediate predecessor, the AIM-7F, this variant of the SPARROW missile incorporates a new low altitude capable active fuze, and a new target seeker featuring improved missile guidance performance in electronic countermeasures and clutter environments.

We are requesting $258.0 million for 936 AIM-7M and 314 RIM-7M missiles in fiscal year 1985.

SIDEWINDER

(U) The SIDEWINDER AIM-9M is the latest version in the series of infrared seeking short range air-to-air missiles and is used on Navy and Marine Corps fighters and some light attack aircraft. The AIM-9M has a significantly improved infrared countermeasure capability and its electronics have been repackaged to use more modern manufacturing methods and to facilitate repair. Initial Operational Capability was achieved for the AIM-9M in September 1982.

We are requesting $68.6 million for 1000 AIM-9M missiles in fiscal year 1985.

PHOENIX

The AIM-54 PHOENIX, an all-weather missile, employs semi-active, mid-course and active guidance and is designed specifically for the F-14 aircraft. It has successfully demonstrated a capability against high altitude and high speed targets, and a high degree of effectiveness during multiple and long range engagements.

A development program to update selected units of the PHOENIX missile commenced in fiscal year 1977. This new missile, designated AIM-54C, incorporates state-of-the-art technology and provides increased missile performance, reliability and readiness. Production commenced in fiscal year 1980.

For fiscal year 1985, we are requesting $443.8 million for 400 AIM-54C PHOENIX missiles.

AIR-TO-SURFACE MISSILES

LASER MAVERICK

LASER MAVERICK is an air-to-surface short range semi-active laser guided missile with a penetrating blast/fragmentation warhead. It is a variant of the Air Force's TV guided missile modified to incorporate a semi-active laser seeker, a larger (300 lb. vs 125 lb.) general purpose blast/penetration warhead with a selectable delay time fuze, and a reduced smoke rocket motor. The missile is planned primarily for Marine Corps use but will be employed with a single rail launcher adaptable to both Navy and Marine Corps tactical aircraft. LASER MAVERICK will be used in the close air support/battlefield interdiction mission to attack enemy installations, equipments and supplies within the Amphibious Objective Area (AOA) and in deep support for the destruction of targets outside the AOA.

$110.6 million is requested in fiscal year 1985 for the procurement of 600 missiles.

HARM

HARM is a high speed, anti-radiation missile designed to destroy or suppress land or sea-based radars supporting enemy air defense systems. HARM performs this function by homing on the radar signals associated with enemy surface-to-air missiles and radar directed anti-aircraft guns. HARM will be deployed on the A-7E, F/A-18 and A-6E aircraft and will correct the operational deficiencies prevalent in earlier anti-radiation missiles through increased speed, greater range, low smoke motor, improved sensitivity, in flight retargeting, and the frequency band coverage needed to counter the threat. It will permit the conduct of tactical air missions effectively with acceptable loss rates. The first HARM/A-7E squadron deployed aboard the USS KITTY HAWK on 13 January 1984.

HARM procurement is sole source from the current prime vendor with the specific congressional proviso that development of a low cost seeker be accelerated. A program addressing this subject was provided to Congress in March.

In fiscal year 1985, 803 missiles at $309.7 million is requested.

IIR MAVERICK

The USN/USMC IIR MAVERICK (AGM-65F) is an air-launched, direct attack weapon for day or night use against ship and land targets. The seeker is imaging infrared, similar to the Air Force IIR MAVERICK. The warhead is a blast fragmentation type with a selectable time delay fuze and is the same as that used in LASER MAVERICK. This missile will be fired from the A-7, F/A-18, A-6, and AV-8B aircraft.

The IIR MAVERICK recently completed a highly successful Development Test and Evaluation at Pt. Mugu, California. Three firings were conducted against stationary and moving ship targets. All three shots hit the targets and caused extensive damage. Operational evaluation is scheduled for late fiscal year 1984 leading to a production decision in fiscal year 1985.

Fiscal year 1985 represents the initial procurement of this missile. $29.7 million for 190 missiles is requested for authorization in fiscal year 1985.

HELLFIRE

HELLFIRE is an all-up-round, semi-active, laser guided air-to-ground missile which has been developed by the Army as its primary anti-armor missile. The Marine Corps will utilize the HELLFIRE on AH-1T/J helicopters. The weapon is the same as the Army HELLFIRE missile, except for the addition of an out-of-line rocket motor ignitor to provide additional shipboard safety. The HELLFIRE will provide the Marine Corps with an effective anti-armor weapon capable of being fired with minimum exposure to the launch aircraft.

FY 1984 is the first year of procurement of the HELLFIRE for the Marine Corps. $25.2 million for 438 missiles is requested for fiscal year 1985.

SURFACE-TO-AIR MISSILES

Standard Missile provides cruisers, destroyers and frigates with an area defense capability against aircraft and missiles. Medium range versions are the SM-1 MR and SM-2 MR. The extended range variant currently in production is designated SM-2 ER. The SM-2 MR and ER models incorporate technical advances over the SM-1 which improve range, accuracy and electronic countermeasures resistance. The Block II version of SM-2 missile, now in production, features all-digital guidance, a new warhead and a dual thrust rocket motor to further increase speed, range and capability against an increasingly capable threat. The SM-2 MR Block II missile will be the primary air defense weapon of TICONDEROGA class cruisers and ARLEIGH BURKE class destroyers. The Navy's fiscal year 1985 request is for 1380 missiles of all three variants, at a cost of $706.6 million.

RIM 116 ROLLING AIRFRAME MISSILE (RAM)

The Rolling Airframe Missile (RAM) is a high power, low-cost, lightweight, complementary self-defense system to engage anti-ship cruise missiles. It has dual mode passive radar frequency/infrared guidance and will be fired from the NATO SEASPARROW Surface Missile System (NSSMS) and the EX-31 launcher. In the case of NSSMS system, two launcher cells will be modified to hold five RAM rounds each. The RAM missile, NSSMS/RAM ORDALT and the EX-31 launcher are presently in Full Scale Engineering Development. For FY 1985, $18.0 million is requested for initial limited production of 30 missiles.

OTHER MISSILE SUPPORT

The Other Missile Support program provides for procurement of Vertical Launching System (VLS) canisters which are used as shipping containers to house the missiles in the VLS cells and act as a launching tube. The VLS is a combined magazine and missile launching system for surface combatants which is capable of launching missiles for all warfare areas and adaptable to present and future weapons control systems. It will be installed on TICONDEROGA class cruisers starting with CG-52, all ARLIEGH BURKE class destroyers and retrofitted into many SPRUANCE class destroyers. For fiscal year 1985 $6.7 million is requested for procurement of VLS canisters.

AERIAL TARGETS

The aerial target program provides training assets to establish and maintain the combat readiness required by Navy personnel in the use of air-to-air and surface-to-air missile and gun systems and for testing new weapons. These targets replicate a wide variety and range of threat missiles and aircraft. The demand for more capable aerial targets which will simulate a realistic aerial threat, combined with inflationary factors, have increased the cost of individual targets beyond that of older and less complex ones. Even so, aerial targets remain vitally important to training and fleet readiness. The fiscal year 1985 budget requests $61.4 million for these targets.

MISSILE MODIFICATIONS

Missile modifications are required to improve and update the performance and operational characteristics of missiles already in inventory. The fiscal year 1985 budget request of "Other Missile" modifications is $68.7 million.

FLEET SATELLITE COMMUNICATIONS

The Navy is requesting $51.4 million in fiscal year 1985 for NASA support and for launching one satellite in 1985. The satellite was procured with FY 1983 funds.

SUPPORT EQUIPMENT

Support equipment and facilities include initial and replenishment spare parts and the improvement of weapon industrial facilities. The fiscal year 1985 request for spares and support equipment and facilities is $177.4 million.

BUDGET ACTIVITY III

TORPEDO AND RELATED EQUIPMENT

MK-48 TORPEDO

The MK-48 Torpedo, which has been in production since 1972, is a submarine launched, acoustically guided dual-purpose anti-submarine and anti-surface ship weapon. This torpedo is the primary tactical weapon for our attack submarines and is carried by strategic missile submarines for self-defense. The fiscal year 1985 request is for $127.7 million for the procurement of 144 torpedoes. Fiscal year 1986 is the last year of MK-48 Mod 4 procurement as all subsequent procurements will be in the Advanced Capability (ADCAP) configuration. The cost of terminating the program will be contained in the FY 1986 budget submit.

MK-46 TORPEDO

The Torpedo MK-46 MOD 5 Near Term Improvement Program (NEARTIP) is an improved version of earlier generation MK-46 torpedoes. It features an acoustic system and countermeasures resistance capability that significantly increases the performance of this in-service conventional lightweight torpedo designed for launch from surface ships, aircraft and helicopters. Fiscal year 1985 represents the last year of the three year multi-year buy initiated in fiscal year 1983. Funding is requested for fiscal year 1985 for the procurement of 1,565 MK-46 NEARTIP torpedoes at $256 million.

CAPTOR

The Encapsulated Torpedo (CAPTOR) is a moored, deepwater, influence activated anti-submarine warfare mine which launches an appropriately modified MK-46 torpedo against submerged submarines and rejects surface targets. The CAPTOR weapon system will interdict and restrict movement of submerged submarine forces. The mine case contains the Detection and Control Unit, mooring mechanism and torpedo firing equipment. Upon target acquisitition and verification, the torpedo is launched to assume a standard MK-46 torpedo search and attack mode. The fiscal year 1985 budget request is for $128.5 million for procurement of 300 CAPTORS.

MK-30 MOBILE TARGET

The MK-30 Mobile Target provides submarine simulation for the support of comprehensive ASW exercises for aircraft, submarines and surface ships. The MK-30 Mobile Target is a versatile and recoverable target and is used to provide anti-submarine warfare training and evaluation operations on instrumented three-dimensional underwater acoustic ranges. The major performance characteristics of the MK-30 Target are: simulation of dynamic maneuvers of modern submarines at speeds up to 30 knots; response to active sonar and torpedo interrogations; generation of submarine-like radiated noise and magnetic anomaly; and the ability to be controlled by preprogrammed or acoustically transmitted instructions.

In fiscal year 1985 we are requesting $21.3 million to support the production of six targets.

MK-38 MINI-MOBILE TARGET

The MK-38 Miniature Mobile Target (MMT) is a small, expendable, hand-launched acoustic device developed as an open ocean ASW basic training target for surface ship hull mounted and towed array sonars and the MK-46 Torpedo. It is small, easy to use and relatively inexpensive. The total request for MK-38 Mini-Mobile Targets in fiscal year 1985 is $2.5 million for 1200 units. The fiscal year 1984 procurement completed a three year multi-year contract. The fiscal year 1985 procurement is the first year of a new three year multi-year contract.

TARGET MK 39 (EXPENDABLE MOBILE ASW TRAINING TARGET)

The Target MK 39 (Expendable Mobile ASW Training Target) is a small expendable target which can be launched from all ASW aircraft as well as surface ships and will provide surface ships and ASW aircraft with an unrestricted open ocean ASW training capability. The Target MK 39 will complement the Mobile ASW Target MK 30 which is designated for on-range use only. Fiscal Year 1986 will be the initial production year.

ANTI-SUBMARINE ROCKET

The Anti-Submarine Rocket (ASROC) is designed to carry either a MK-46 Torpedo or nuclear depth charge payload. This system is used against submarines by frigates, destroyers and cruisers. Funds are required to procure replacement components expended during ASROC exercise firings and for production support efforts. Funding of $25.9 million for fiscal year 1985 is requested.

VERTICAL LAUNCH ASROC

The Vertical Launch Anti-Submarine Rocket provides an intermediate range, all weather, quick reaction Anti-Submarine Warfare capability for ships designated to receive the new Vertical Launching System (VLS). The Vertical Launch Anti-Submarine Rocket will be compatible with the MK-46 Torpedo, MK-50 Torpedo and a new nuclear depth bomb. Authorization will be requested in fiscal year 1986 to procure pre-production test and tooling equipment.

SUBMARINE LAUNCHED MOBILE MINE

The Submarine Launched Mobile Mine uses unique mine components and Torpedo MK-37 components to provide submarines with a standoff mining capability. $22.6 million is requested in fiscal year 1985 to produce 280 tactical mine configurations.

TORPEDO MODIFICATIONS

The following are the primary objectives of the torpedo modification program:

MK-46 TORPEDOES

In fiscal year 1985, CAPTOR Torpedo modification kit procurement will be complete with the purchase of 300 MK-46 MOD 4 kits for $2.3 million is fiscal year 1985. These MOD kits enable the deployment of the MK-46 torpedo as the CAPTOR payload.

MK-48 TORPEDO (ADCAP)

A total of $108.9 million is requested in fiscal year 1985 to continue procurement of the MK-48 Advanced Capability (ADCAP) modification required to counter the projected Soviet threat. This modification provides improvements to the homing, guidance control and propulsion subsystems, thus keeping the MK-48 a viable weapon into the 1990's.

CAPTOR MINE

The fiscal year 1985 request of $5.7 million provide for continued procurement of modifications for stockpiled weapons. These modifications will improve CAPTOR performance.

SWIMMER WEAPON SYSTEM

The Swimmer Weapon System is a new and unique program that allows Navy Special Warfare Forces to carry out beach clearance and underwater and direct action missions from a standoff distance. The system consists of a standoff weapon (a modified MK-37 torpedo) and the hardware necessary to attach and fire the weapon from a swimmer delivery vehicle. A total of $1.6 million is requested to support this program in fiscal year 1985.

TORPEDO AND ASW RANGE SUPPORT

The torpedo support category provides initial spares to support new and existing inventories of underwater ordnance, procures torpedo components to replace those expended during exercise firings and provides for the procurement of ASW target exercise components and exercise range equipment and support efforts. A total of $96.0 million is requested for this purpose in fiscal year 1985.

BUDGET ACTIVITY IV

OTHER WEAPONS

PHALANX CLOSE-IN WEAPONS SYSTEM

Fiscal year 1985 represents the eighth year of procurement of the PHALANX Close-In Weapon System (CIWS). CIWS is being installed on a wide variety of surface ships providing a high confidence, terminal defense system that will allow automatic detection, track and kill of sea-skimming anti-ship missiles or low-flying aircraft that penetrate fleet area defense.

As a result of the increased air threat throughout the Middle East, the Navy has carried out a series of actions to ensure that every ship capable of mounting CIWS is so equipped prior to sailing for that region. Specifically, all uninstalled assets are being mounted on ships deploying in 1984 on a priority basis. PHALANX systems earmarked for non-deploying ships have been diverted to near-term deployers. For the longer term, the Navy is initiating the actions necessary to accelerate production of CIWS in FY 1985. Altogether, 16 ships not originally scheduled to receive CIWS in 1984 will have the system onboard when they depart the United States.

CIWS has undergone one of the mose extensive and rigorous testing programs ever conducted by the Navy. System requirements have been met or exceeded. Based upon OPEVAL results in 1977, the Chief of Naval Operations granted Approval for Service Use. A total of 616 systems are now planned for production, of which 391 will be with WPN funds.

For fiscal year 1985, $163.9 million is requested for 51 systems.

MK-75 76MM GUNS

The MK-75 76MM Gun System, designed by Oto Melara of Italy and produced by Oto Melara and FMC Northern Ordnance Division, Minneapolis is a dual purpose, high rate of fire gun system. Because of its performance, light weight and reduced manning requirements, the MK-75 has been chosen for the Navy FFG-7 Class Guided Missile Frigate, The Patrol Combatant PHM, the Coast Guard WHEC-378 Class and WMEC-270 Class Cutters. In the context of the requirements for service use, the MK-75 Gun System is Approved for Full Production. In order to shock harden the MK-75, redesigned components will be barge shock tested in mid 1984. In fiscal year 1985, 10.9 million is requested for procurement of two gun systems for Coast Guard Hamilton Class Cutters and one system as the first increment of a rotatable pool for both Coast Guard and Navy ships. The maintenance concept for these ships is based on the periodic replacement of the systems on a six year cycle instead of in-place overhaul. This program will result in a substantial savings.

40MM MACHINE GUN

This is a multi-service program with USMC, USA and USAF procurements in FY 1984 through FY 1986. The MK-19 Mod 3 40MM machine gun is a belt-fed automatic grenade launcher which fires over 300 40MM grenades per minute to a maximum range of 2400 yards. It has received approval for service use on auxiliary and amphibious ships, patrol boats and within Construction Battalions. The request is for $2.0 million in FY 1985 for 58 guns.

25MM GUN MOUNTS

This system consists of the Army 25mm M242 Bushmaster cannon on the MK-88 Naval Mount. It will replace the obsolete 20MM MK-16 machine guns as the general purpose short range armament for patrol boats and new construction amphibious or auxiliary ships. Gun procurement will be by add-on to Army production contracts and mount manufacture will be done by Naval Weapons Support Center, Crane, Indiana. Multiple source ammunition production is established. The budget request for $3.1M in FY 1985 is to procure 17 systems.

SMALL ARMS AND WEAPONS

The requested funding for the Small Arms and Weapons Program of $3.5 million in fiscal year 1985 and authorization for $5.1 million in fiscal year 1986 provides for procurement, modernization, standardization and stock replenishment of a wide wariety of weapons of .50 caliber and below, including gun mounts and associated support components. The procurement of the various types and quantities of weapons is required to meet allowances and inventory objectives for training, security, afloat and ashore missions affecting approximately 2400 ships and shore activities Navy wide as well as specifically equipped weapons to support the Seal Teams, Mobile Construction Battalions and Special Warfare Units.

MODIFICATIONS AND SUPPORT EQUIPMENT

A total of $46.9 million is requested in fiscal year 1985 for gun modifications and support equipment. These programs are for hardware to correct safety deficiencies and to improve operability, reliability and maintainability. Included is the modification for the PHALANX CLose In Weapon System to provide increased magazine capacity and increased search elevation angle, as well as other performance upgrades.

SUMMARY

Having summarized our request for 1985, it is appropriate to note that the time required for contracting, material procurement, manufacturing and delivery for items approved in this budget is approximately 24 months. Thus, the end of the "Funded Delivery Period" for munitions approved this year will be fiscal year 1987. In other words, the level of procurement funded this year will have significant impact on the state of our inventories during the latter part of the 1980's and into the 1990's.

In conclusion, it is important to recall that the mission of the Navy, as set forth in Title 10, U.S. Code, is to be prepared to conduct prompt and sustained combat operations at sea in support of the national interest. The ordnance procured by the WPN appropriation provides the key to the fleet's ability to carry out its mission. Your support of this year's budget request, which reflects our best estimate of the required mix and cost of these weapons, will continue the steady progress toward full sustainability which has marked the preceding years of this decade.

Senator COHEN. At this point we will also insert a statement for the record from Rear Adm. Dan Cooper, in support of the "Other Procurement, Navy" budget request.

[Prepared statement of Admiral Cooper follows:]

PREPARED STATEMENT OF REAR ADM. DANIEL L. COOPER, U.S. NAVY, DIRECTOR, FISCAL MANAGEMENT DIVISION, OFFICE OF THE CHIEF OF NAVAL OPERATIONS

Mr. Chairman and members of the Committee, it is a pleasure to present the fiscal year 1985 budget request for the Other Procurement, Navy (OPN) appropriation.

The Other Procurement, Navy appropriation is essentially the same in program content and structure as presented last year. The fiscal year 1985 OPN budget request is $5,953.9 million. There are approximately 400 equipment programs in this appropriation. Specifically, OPN finances the procurement of weapons and equipment other than aircraft, missiles, ships and torpedoes. The procurements support programs to improve the active fleet and shore establishment by the introduction of equipments to expand or maintain existisng capabilities or to provide for replacement of obsolescent units. Equipments that are funded range from the latest electronic sensors and weapons systems which update our naval forces, to trucks, medical equipment and spare parts; from simple office equipment to sophisticated electronics and ADP systems. Other items funded include air and ship launched ammunition to meet combat requirements and training readiness; nuclear cores and components for nuclear powered surface ships and submarines; and training equipment in support of shipboard operational equipment.

TABLE 1.—OTHER PROCUREMENT, NAVY BUDGET ACTIVITIES

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Total request	4,314.5	5,953.9	7,952.4
Ship support equipment	666.5	857.1	1,331.2
Communications and electronics equipment	1,513.4	1,813.8	2,488.7
Aviation support equipment	660.7	1,081.5	1,143.2
Ordnance support equipment	901.2	1,229.6	1,843.8
Civil engineering support equipment	186.4	313.3	432.5
Supply support equipment	106.4	130.1	144.0
Personnel and command support equipment	279.9	528.5	569.0

This request of $5,953.9 million continues to emphasize modernization and improvement of fleet readiness and is summarized in seven Budget Activities (Table 1). This request is $1,639.4 million over the revised fiscal year 1984 program (Table 2). From a real program value point of view, this equates to an increase of about 32.2%. When compared with the fiscal year 1984 original request, prior to Congressional reductions, the increase of $952.1 million would equate to 14.0% real growth.

TABLE 2.—OTHER PROCUREMENT, NAVY BUDGET ACTIVITIES

[In millions of dollars]

	Fiscal year 1984	Change	fiscal year 1985
Total request	4,314.5	+1,639.4	5,953.9
Ship support equipment	666.5	+190.6	857.1
Communications and electronics equipment	1,513.4	+300.4	1,813.8
Aviation support equipment	660.7	+420.8	1,081.5
Ordnance support equipment	901.2	+328.4	1,229.6
Civil engineering support equipment	186.4	+126.9	313.3
Supply support equipment	106.4	+23.7	130.1
Personnel and command support equipment	279.9	+248.6	528.5

The OPN appropriation is structured on a commodity basis as opposed to a programmatic basis and the budget is officially submitted in Budget Activities as depicted in Table 1. The focus of today's presentation will be on those portions of the Other Procurement, Navy appropriation under the cognizance of the Subcommittee on Seapower and Force Projection. A total of $4,407.5 million has been requested for equipments included under the purview of this subcommittee in these budget activities. These equipments comprise 74.0 percent of the total value of the OPN appropriation request. The remaining items in the OPN request are under the congnizance of other subcommittees (Table 3).

TABLE 3.—OTHER PROCUREMENT, NAVY, BREAKDOWN OF FISCAL YEAR 1985 BUDGET REQUEST BY COGNIZANT SASC SUBCOMMITTEE BUDGET ACTIVITIES

[In millions of dollars]

Program by budget activities	Total fiscal year 1985 budget request (100 percent)	Subcommittee on Seapower and Force Projection (74.0 percent)	Other subcommittees (26.0 percent)
Total request	5,953.9	4,407.5	1,546.4
1. Ship support equipment	857.1	780.9	76.2
2. Communications and electronics equipment	1,813.8	1,615.1	198.7

TABLE 3.—OTHER PROCUREMENT, NAVY, BREAKDOWN OF FISCAL YEAR 1985 BUDGET REQUEST BY COGNIZANT SASC SUBCOMMITTEE BUDGET ACTIVITIES—Continued

[In millions of dollars]

Program by budget activities	Total fiscal year 1985 budget request (100 percent)	Subcommittee on Seapower and Force Projection (74.0 percent)	Other subcommittees (26.0 percent)
3. Aviation support equipment	1,081.5	430.8	650.7
4. Ordnance support equipment	1,229.6	890.7	338.9
5. Civil engineering support equipment	313.3	161.5	151.8
6. Supply support equipment	130.1	0	130.1
7. Personnel and command support equipment	528.5	528.5	0

Before I discuss the specific programs included in our fiscal year 1985 budget request. I would like to explain how we arrive at the dollar figures requested. A large portion of the equipments procured in OPN, particularly Budget Activities 1, 2, and 4, are related to the Fleet Modernization Program. During regular ship overhauls or shorter availability periods, it is necessary to replace many of the basic hull, mechanical, and electrical systems in order to eliminate obsolescent equipments and to introduce equipments which are more efficient, capable, and easier to maintain. Examples of such equipment procurements are pumps, generators, air compressors, propellors, steam plant components, and nuclear reactor components. Similarly, as the technology of modern warfare grows more sophisticated during the ship's life, it is necessary to upgrade many of the weapons systems, sensor systems, communications systems, and tactical data processing systems on the ship. For example, many of our surface combatants are undergoing a major improvement to their anti-air warfare capabilities. This improvement, known as the New Threat Upgrade, involves the procurement of major modifications to the AN/SPS-48 Radar, the AN/SPS-49 Radar, the surface missile fire control systems, and the addition of a tactical data processing device to integrate the output of the two radars.

Since most of the aforementioned equipments are installed during regular ship overhauls, it is not necessary to procure all of the equipments in a single year. Rather we phase the procurements in such a way that equipments are delivered shortly before each individual ship overhaul period begins. This means that most equipment procurement programs extend about five years since that is the length of time it usually takes for all of the ships in a given ship class to enter overhaul. The total quantity to be procured of any given equipment is calculated by ascertaining which ship classes are to receive the equipment and counting the number of ships in each class. Additional equipments are procured to satisfy shore-based training requirments, configuration control requirements, and depot repair requirements.

The first Budget Activity request, Ship Support Equipment, includes $780.1 million under the purview of this subcommittee, an increase of $142.3 million more than fiscal year 1984 (Table 4). The funding requested in this Budget Activity will procure equipments to modernize the Hull, Mechanical and Electrical (H,M&E) capabilities of our current Navy ships, procure nuclear power units and components for nuclear powered ships, and procure Other Shipboard Equipment required to maintain and modernize the fleet.

TABLE 4.—OTHER PROCUREMENT, NAVY, BREAKDOWN WITHIN BUDGET ACTIVITY [1]

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Ship support equipment	638.6	780.9	1,235.1
Hull, mechanical and electrical (H,M&E) equipment	100.6	151.8	232.1
Ship propulsion equipment	28.3	38.3	83.8
Pumps	5.6	11.8	26.8
Navigation equipment	31.1	44.0	57.9

TABLE 4.—OTHER PROCUREMENT, NAVY, BREAKDOWN WITHIN BUDGET ACTIVITY [1]—Continued

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Other H,M&E	35.6	57.7	64.6
Reactor plant equipment	353.7	396.1	590.0
Reactor power units	160.3	177.2	336.0
Reactor components	193.4	218.9	254.0
Other shipboard equipment	184.3	233.0	413.0
Submarine silencing equipment	13.5	16.5	22.8
Sealift support equipment	27.7	24.1	100.8
Surface IMA	9.8	5.1	13.2
Naval special warfare equipment	17.6	20.3	31.8
Other	115.7	167.0	244.0

[1] Those portions under the cognizance of the SASC Seapower and Force Projection Subcommittee.

Significant equipments procured in the H,M&E area are ship propulsion equipment, various pumps and navigation equipment. The fiscal year 1985 request for ship propulsion equipment is $38.3 million. Examples of these procurements include modifications designed to improve the reliability, maintainability, and durability of the LM 2500 Gas Turbine Engines installed in the DD-963 and FFG-7 Class ships, as well as necessary spare engines. These funds will also procure modifications to improve the reliability of existing steam propulsion plants, as well as fin stabilizers for FFG-7 class frigates. The request for $11.8 million in fiscal year 1985 for shipboard pumps satisfies requirements to replace obsolescent and inefficient pumps with upgraded pumps. Additionally, this program supports a rotatable pool to continually support the submarine Extended Operating Cycle (EOC) program. $44.0 million is requestd to procure navigation equipment such as the Electrically Suspended Gyro Navigator (ESGN), which will replace and modernize the current inertial navigation systems on SSN-637 and SSN-688 class submarines.

The fiscal year 1985 request for Reactor Plant Equipment is $396.1 million, an increase of $42.4 million as compared with fiscal year 1984. The major items procured in this category are nuclear reactor cores required for refueling of nuclear powered ships. The fiscal year 1985 procurement request for cores is $177.2 million; also included in this category is $218.9 million for spares and replacement reactor plant components and equipment required for the continued safe operation of the Navy's nuclear reactors. Replacement core procurement requests are based on long term Navy needs and have been approved for several years on the basis of being the most economical, efficient method of procuring replacement fuel for nuclear powered ships. Further, procurement in accordance with these stabilized plans minimizes the risk of non-availability of cores for emergency replacement while maintaining a viable, two-vendor base for reactor cores.

The remaining funds requested in Budget Activity 1 ($233.0 million) will provide for procurement of various other shipboard equipments to support improvement and modernization programs or as part of a planned maintenance replacement program. For example, Submarine Silencing Equipment at $16.5 million procures hardware developed from a variety of technical efforts aimed at minimizing the detectability (self noise) of our SSNs and SSBNs thus improving their ability to detect other submarines. The $24.1 million Sealift Support Equipment funding provides for the procurement of equipment to enhance the capability of merchant ships performing Naval auxiliary roles to resupply in-theatre forces by serving as resupply shuttle ships or underway replenishment ships. Other significant procurements include $20.2 million for Naval Special Warfare Equipment. The funds requested for Naval Special Warfare Equipment will furnish our Sea-Air-Land (SEAL) and Underwater Demolition Teams (UDT) with necessary equipments to fulfill assigned missions. Finally, the $8.2 million for Firefighting Equipment will be used to correct specific deficiencies discovered during INSURV inspections aboard fleet units.

Budget Activity 2, Communications and Electronics Equipment, is the largest budget activity in the OPN appropriation (Table 5). The fiscal year 1985 budget request for Communications and Electronics Equipment under this subcommittee's jurisdiction is $1,615.1 million, an increase of $223.8 million over the fiscal year 1984 budget. The rationale for this increase will be addressed during the discussion of each of the major areas included in the budget request.

TABLE 5.—OTHER PROCUREMENT, NAVY, BREAKDOWN WITHIN BUDGET ACTIVITY 2 [1]

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Communications and electronics equipment	1,391.3	1,615.1	2,072.1
Ship radars	129.4	171.4	208.5
Ship sonars	223.9	223.5	197.9
ASW electronics equipment	273.8	310.0	406.2
Reconnaissance and electronic warfare	117.8	208.4	402.7
Other shipboard electronics	275.8	275.8	308.6
Shipboard communications equipment	261.4	308.7	348.6
Shore communications equipment	31.6	50.3	97.2
Other shore electronic equipment	77.6	67.0	102.4

[1] Those portions under the cognizance of the SASC Seapower and Force Projection Subcommittee.

The $117.4 million requested for Ship Radars will provide for the procurement of equipment to modernize the Navy's surface search radars, two-dimensional air search radars, and three-dimensional air search radars. The significant line items included in this category are the AN/SPS-48 three-dimensional air search radar ($81.7 million), the AN/SPS-49 two-dimensional air search radar ($16.4 million), the AN/SYS-2 Integrated Automatic Detection and Tracking System ($18.0 million), the MK-23 Target Acquisition System ($10.6 million), and the AN/SPS-40 two-dimensional air search radar ($14.9 million).

A major segment of this funding is tied to the New Threat Upgrade Combat System (NTU). Procurement of this NTU System, an anti-air warfare program to counter the latest missile threats, was initiated in fiscal year 1983 and is continued in fiscal year 1985 with the procurement of seven combat systems. The New Threat Upgrade Combat System consists of three principal components, (1) a new SM-2(ER) Block II missile, funded in the Weapons Procurement, Navy appropriation, (2) engagement system modifications, funded in OPN Budget Activity 4, and (3) significant improvements to the AN/SPS-48 and AN/SPS-49 air search radars, including the addition of the AN/SYS-2 to integrate the outputs of these two radars, all funded in this Budget Activity. The modification to the AN/SPS-48 radar will provide higher elevation angle coverage, increase average power output, and provide frequency and pattern flexibility to avoid spot jamming while detecting targets through heavy clutter. The modification to the AN/SPS-49 radar will provide enhanced electronic counter-counter measures (ECCM) processing and an automatic target detection (ATD) capability. The AN/SYS-2 will correlate contact data from the AN/SPS-48 and AN/SPS-49 and provide a single target output to the ship's command and decision system automatically. Installation of the New Threat Upgrade Combat System is scheduled for Terrier missile ships of the CG-16 and CG-26 classes, as well as CGN-9, CGN-25, CGH-35 and DDG-42 (22 Terrier ships). It is also scheduled for installation in Tartar missile ships of the CGN-36, CGN-38, and DDG-993 classes (10 Tartar ships).

The fiscal year 1985 budget request for Ship Sonars is $223.5 million, essentially the same as the fiscal year 1984 budget of $223.9 million. $56.4 million is requested to continue procurement of the AN/SQS-53B surface ship sonar improvement program. This program improves the maintainability of this sonar, reduces manning requirements, and allows integration of the AN/SQS-53 sonar with other sonar systems, such as the Tactical Towed Array Sonar (TACTAS) using standard modules. $94.8 million is requested for the AN/BQQ-5 submarine sonar to continue the procurement of modification kits to upgrade these sonars to the AN/BQQ-5C Expanded DIFAR configuration and to start production of the TBX array. AN/BQQ-5C modification kits have been in production since fiscal year 1981 and will provide a significant improvement to the acoustic sensors on our tactical submarines. The TBX array provides improved capability over the TB-16 array in detection, classification, tracking, and localization. Finally, $42.0 million is requested for replacement sonar switches and transducers for both surface ship and submarine sonars. These switches and transducers are considered to be significant fleet readiness items and must be available to replace defective units during scheduled ship overhauls.

The $310.0 million requested for Anti-Submarine Warfare (ASW) Electronics Equipment provides for the procurement of a diverse group of ASW-related equipments, and represents an increase of $36.2 million over the fiscal year 1984 request. $84.3 million is requested for the continued modernization of both the underwater segment and the shore processing segment of our SOSUS system. Last year, we procured 12 AN/SQR-19 Tactical Towed Array Sonar (TACTAS) systems for a total of $107.9 million. This year, we are procuring 10 systems for a total of $114.9 million. The AN/SQR-19 will be backfitted into the Navy's DD-963, FFG-7, DDG-993, and CG-47 class ships where it will serve as the primary long-range, passive acoustic sensor to "trigger" the LAMPS MK III system. $33.8 million is requested for follow-on procurement of new towed arrays and modification kits for the AN/SQR-18 Tactical Towed Array Sonar (TACTAS) system which is installed on most FF-1052 class ships. Other items requested in the ASW Electronics category include improvements to the AN/SQR-17 Acoustic Processor ($8.9 million), shore equipment in support of SURTASS ($6.7 million), and modernization of our shore-based ASW Operations centers ($24.4 million). Finally, $16.9 million is requested for follow-on procurement of the Carrier ASW Module. This system supports embarked carrier ASW airborne weapons systems by providing real time and post mission analysis of acoustic signals.

The $208.4 million requested for Reconnaissance and Electronic Warfare Equipment provides for the procurement of anti-ship missile defense (ASMD) electronic warfare (EW) systems such as the AN/SLQ-17 and the AN/SLQ-32, the procurement of cover and deception systems, and the procurement of tactical intelligence systems such as OUTBOARD and the Naval Intelligence Processing System (NIPS). In addition, the fiscal year 1985 program includes $18.1 million for initial procurement of COMBAT DF, which provides the Electronic Warfare Signals and Direction Finding System with the capability to detect, locate, and identify targets at long range and to feed this information into the ships tactical data system. Fiscal year 1985 also marks the first procurement year for the SLQ-32(V)3; $23.2 million is requested for this effort.

The $275.8 million requested for Other Shipboard Electronics Equipment represents no change for the fiscal year 1984 request. A large portion of this funding ($111.2 million) is for continued modernization of the Navy Tactical Data Systems (NTDS) on frigates, cruisers, and aircraft carriers. NTDS is a vital system in major warships which permits rapid integration of ship sensor information, analysis and display of tactical information, and designation of weapon systems to force threats. Other programs funded in the category are training equipment ($3.3 million), and spares and repair parts ($128.5 million).

The $308.7 million requested for Shipboard Communications Equipment includes funding for general shipboard communications ($72.2 million), unique submarine communications ($20.2 million), satellite communications terminals ($57.3 million), and cryptographic devices ($159.0 million). Within the $72.2 million requested for general shipboard communications, $17.6 million is for procurement of two new radios, the AN/WSC-3 and the AN/URC-93, which will replace seven obsolescent UHF radios currently in the fleet. Also included in this category is $8.5 million for initial procurement of AN/SRC-47 Flight Deck Communications Systems. The AN/SRC-47 radios will provide a secure voice communications system for key personnel involved in aircraft handling operations on board air capable ships. Within the $53.7 million requested for satellite communications terminals, $19.4 million is budgeted for procurement of Demand assigned Multiple Access (DAMA) system. The DAMA system provides a five to one increase in channel capacity on the LEASAT satellite system, thereby enabling LEASAT to have a capability comparable to FLTSATCOM. The $159.0 million budgeted for cryptographic devices provides for the continuing support of the Navy and Marine Corps communications security program. Although funded by Navy, the cryptographic devices are procured through the National Security Agency.

The $67.0 million requested for Shore Electronics Equipment includes a variety of different equipments. The two largest items in this category are General Purpose Electronic Test Equipment (GPETE) ($25.0 million) and the Navy Command and Control System (NCCS) Ashore ($16.7 million). The GPETE funding is required for initial outfitting of both the ship and shore units. The NCCS Ashore funding will provide for the modernization of our shore based command centers.

The $50.3 million requested for Shore Communications Equipment will provide support both to the Defense Communications System and to Naval Communications activities worldwide. The largest line item in this category, Shore HF Communication, includes $16.7 million for procurement of equipment to replace HF assets that are becoming obsolete. Procurement of this equipment will provide coverage in areas where satellite support is lacking or where fleet communications requirements exceed existing capability.

A total of $430.8 million is requested for equipment under this subcommittee's purview in Budget Activity 3, Aviation Support Equipment, shown in Table 6. Included within this request is $323.1 million for Sonobuoys and $107.7 million for Aircraft Support Equipment.

TABLE 6.—OTHER PROCUREMENT, NAVY, BREAKDOWN WITHIN BUDGET ACTIVITY 3 [1]

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Aviation support equipment	276.8	430.8	359.7
Sonobuoys	192.8	323.1	262.2
Lamps MK III shipboard equipment	69.9	75.9	59.1
Aircraft support equipment	14.4	31.8	38.4

[1] Those portions under the congnizance of the SASC Seapower and Force Projection Subcommittee.

The fiscal year 1985 budget request of $323.1 million for Sonobuoy procurement has been formulated considering the number of ASW carrier air groups and shore based ASW patrol squadrons to be supported, actual and planned peace-time usage for these forces, and the necessary training allowance requirements. User aircraft include the S-3A, P-3, SH-2D, and SH-3 series. The specific sonobuoys to be procured are: the AN/SSQ-36 bathythermograph sonobuoy which provides a vertical water temperature profile; the AN/SSQ-53, a passive directional sonobuoy used during the target localization phase of air ASW missions; the AN/SSQ-57 which obtains acoustic and sound pressure level data and measures ambient noise; the AN/SSQ-62, an active directional sonobuoy; the AN/SSQ-77, a passive directional sonobuoy utilizing a line array of omni-directional hydrophones and a DIFAR element; the AN/SSQ-71, an airborne two-way acoustic communication sonobuoy; and the AN/SSQ-86, a one way accoustic communication sonobuoy which provides the link between ASW aircraft and submerged submarines.

The $186.2 million for Aircraft Support Equipment supports a variety of programs. $75.9 million is for the procurement of LAMPS MK III Shipboard Equipments. Each ship set consists of an AN/SQQ-28(V) electronic sonar signal processing system, and AN/SRQ-4 shipboard terminal data transmission device, and a helicopter landing system (HLS). Eleven ship sets are budgeted in fiscal year 1985. In addition, $16.1 million is budgeted for Airborne Mine Countermeasures Equipment such as the AN/AQS-14 minehunting sonar for use with the MH/CH-53D helicopters. Airborne Mine Countermeasures detachment support equipment is also funded in this line. The fiscal year 1985 request includes funds to expand our operational capability from two sites simultaneously to five sites simultaneously. Finally, $15.7 million is budgeted for Marine Expeditionary Airfields.

The next Budget Activity is Ordnance Support Equipment for which $890.7 million is under this subcommittee's cognizance. This represents an increase of $205.2 million as compared with fiscal year 1984 (Table 7). The rationale for this funding increase will also be addressed during the discussion of each of the major areas included in the budget request. In Ship Gun Ammunition, $68.2 million is requested for procurement of 5 Inch Guided Projectile ammunition. With its laser guidance system, this projectile will provide the fleet with a high first shot hit capability previously lacking in surface gunnery systems.

TABLE 7.—OTHER PROCUREMENT, NAVY, BREAKDOWN WITHIN BUDGET ACTIVITY 4 [1]

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Ordnance support equipment	685.5	890.7	1,342.7

TABLE 7.—OTHER PROCUREMENT, NAVY, BREAKDOWN WITHIN BUDGET ACTIVITY 4 [1]—Continued

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Ship gun ammunition	43.9	68.2	106.5
Ship gun system equipment	28.8	42.4	67.5
Ship missile system equipment	326.8	469.5	724.2
ASW support equipment	119.9	94.8	162.9
Other ordnance support equipment	23.1	29.0	36.3
Other expendable ordnance	69.5	83.8	127.9
Spares and repair parts	73.5	103.0	117.4

[1] Those portions under the congnizance of the SASC Seapower and Force Projection Subcommittee.

$469.5 million is requested for Ship Missile System Equipment which is an increase of $142.7 million over fiscal year 1984. These equipments will be utilized to modernize and increase the shipboard offensive and defensive missile capabilities. These programs include Surface Missile System (SMS) Ordnance Alterations (ORDALTS), AEGIS Support equipment and Surface/Submarine Tomahawk Support Equipment. The SMS ORDALT program is designed to improve the reliability, performance, and safety of currently deployed missile systems: Terrier, Tartar, and NATO Seasparrow (Point Defense). Significant items included in the fiscal year 1985 request of $190.3 million for Terrier and Tartar are the procurement of Terrier ordnance alterations to improve system reliability and maintainability, as well as four ship sets of SM-2 modifications to the Tartar Missile Systems. SMS ORDALTS also include the procurement of self defense systems such as NATO Seasparrow ($14.7 million), and associated improvements. The AEGIS Support Equipment request of $29.7 million will procure equipments necessary to support the in-service engineering and fleet training program for *Ticonderoga* (CG-47) class AEGIS cruisers. This funding will provide special tooling and test equipment for unique AEGIS depot activities, as well as procurement of twenty-seven sets of BGAAWC Auto Gridlock equipment to improve anti-air warfare coordination in the battle groups of the fleet. Finally the Tomahawk Support Equipment request of $212.3 million provides five surface Weapon Control Systems, three vertical launch systems, and ten submarine modifications (7 shipboard and 3 trainers).

The ASW Support Equipment request in fiscal year 1985 is $94.8 million, a decrease of $24.2 million from 1984. The most significant program included in the ASW Support Equipment category is the All Digital Attack Center (MK-117 Fire Control System) at $38.4 million. The MK-117 is installed aboard SSN-594, SSN-637 and SSN-688 class submarines, providing modern, high speed digital computing facility with digital driven display. This enables the submarine to conduct advanced target motion analysis, to automatically set the MK-48 torpedo, and to control and display weapon launch. The other major program in this category is the ASW Control System (MK-116 Fire Control System) at $30.8 million. This program provides surface combatants with an integrated ASW combat system to effectively manage the large numbers of passive and active sonar contacts generated by the introduction of new systems such as TACTAS and LAMPS MK III.

A total of $112.8 million is requested in fiscal year 1985 for Other Ordnance Support Equipment and Other Expendable Ordnance which consists of a variety of other ordnance programs including procurement of Quickstrike mines ($35.7 million). The remaining $103.0 million in this Budget Activity is for Spares and Repair Parts, including initial and replenishment spares for the majority of major systems procured in this budget activity, such as ASW systems ($10.4 million), and AEGIS ($22.4 million).

The request for Civil Engineering Support Equipment in Budget Activity 5 is $161.5 million, an increase of $66.2 million as compared with fiscal year 1984 (Table 8). The equipment in the fiscal year 1985 Amphibious Support Equipment line will be used by the Navy Support Elements (Naval Beach Groups) to provide essential logistic support to Marine Corps Air Group Task Forces in advanced base contingency operations. The items being procured are used primarily for transfer of vehicles and dry cargo from ship to shore. The equipment includes such things as non-powered causeway sections, powered causeway sections, an elevated causeway, and side loadable warping tugs. In addition, we are procuring two LASH lift beams which provide commercial LASH ships with the capability to load non-standard size equipment (such as pontoon causeways). LIFT/launch gear for side loading powered and non-powered causeways aboard Navy LSTs, and hose systems to offload liquid cargo are also being procured in this line.

TABLE 8.—OTHER PROCUREMENT, NAVY, BREAKDOWN WITHIN BUDGET ACTIVITIES 5 AND 7 [1]

[In millions of dollars]

	Fiscal year—		
	1984	1985	1986
Civil engineering support equipment	95.3	161.5	225.1
Fleet hospital support equipment	58.2	71.9	79.2
Amphibious equipment	34.0	87.1	136.4
Other civil engineering equipment	3.1	2.5	9.5
Personnel and command support equipment	279.9	528.5	569.0
Training devices	88.0	108.7	127.0
Command support equipment	96.4	134.4	151.9
Computer acquisition program	76.9	264.5	283.6
Productivity programs	18.6	20.9	6.5

[1] Those portions under the cognizance of the SASC Seapower and Force Projection Subcommittee.

The Fleet Hospital program ($71.9 million) will acquire deployable medical systems (field hospitals) which will care for combat casualties from the Fleet and Fleet Marine forces as part of the Navy/Marine Corps continuum of casualty care. There are two types of Fleet Hospitals: one for the communications zone (Unthreatened area), and one for the rear of the combat zone. The communications zone hospital has a wider and more sophisticated range of care but is less mobile than the combat zone version. The fiscal year 1985 program will procure one 500-bed combat zone hospital, one 500-bed communications zone hospital and one 1000-bed communications zone hospital in support of the Rapid Deployment Joint Task Force. All hospitals procured under the Fleet Hospital program will use equipment standardized among the three services. All elements of these hospitals will consist of commercially available off-the-shelf equipment consistent with operational needs of the military mission.

For Budget Activity 7, Personnel and Command Support Equipment, $528.5 million is requested (Table 8). This amount represents an increase of $248.6 million over the fiscal year 1984 request. Funding of $108.7 million is for replacement and enhancement of training equipment in the surface and subsurface communities. Surface and subsurface training devices provide the necessary maintenance, operator combat team, and refresher training for new combat systems being introduced to the fleet. The procurement agenda for training includes the Perry Class Pierside Combat System Team Trainer which provides all onboard radar, sonar, weapon launched LAMPS equipment on FFG 7 Class Ships with simulated threat target data. Surface warfare related SQQ-89 maintenance and operator trainers are also included. The 14F series trainers will produce controlled training fires of propane gas in realistic environments. The Submarine Tactical Visual Training System trains personnel in submarine attack centers to integrate visual information with other sensor information to make appropriate critical tactical decisions. The Submarine Combat System Team Trainer aids land based training for combat system attack center teams. These trainers are exemplary of the training support devices dictated by the growing complexity and importance of submarine tactics and strategies. The fiscal year 1985 budget also addresses the class and field instruction training aid requirements for individual military training. The individual training for over 150 officer designations and enlisted ratings places significant burdens on the Navy training community to maintain, modify and store spare parts for numerous training devices described in the budget. Training and training support devices afford significant savings in team and individual training operations. At the same time such devices increase our opportunities for enhancing military preparedness.

Funding of $134.4 million is requested for replacement and enhancement of Command Support Equipment. This funding provides for procurement of support equipment required by Active and Reserve Command Activities, not otherwise provided for within the appropriation structure. Requested funds provide for procurement of general and administrative support equipment as well as medical equipment required by shore activities and forces afloat under command of the fleet claimants. This request also includes the procurement of scientific, technical and related (undersea) survey equipment used by the Oceanographer of the Navy in the collection, processing, and analysis of acoustical, geophysical, bathymetric, and navigational data through coastal and deep ocean surveys. These surveys provide the data with which undersea craft can navigate precisely without relying upon electronic navigation systems.

In fiscal year 1985, $264.5 million is requested for procurement under the Navy's Computer Acquisition Program (CAP). This program optimizes the purchase of general purpose nontactical automatic data processing equipment (ADPE) Navy-wide. The CAP is centrally managed within the Navy, thereby avoiding the proliferation and duplication of functional systems, capitalizing on ADP technology, and controlling ADP growth. Major programs include Shipboard Operational ADPE, which replaces and upgrades nontactical automated support on larger mechanized ships and Marine air Groups and provides initial automated capability for the alleviation of administrative burdens aboard smaller ships. Funds are included for the Naval aviation Logistics Command Management Information System (NALCOMIS). NALCOMIS will respond to the aircraft maintenance and material management requirements at air stations, aboard aircraft carriers, amphibious aviation helicopter assault ships and Marine Corps aircraft groups. Funding provides for equipment for the Stock Point Logistics Integrated Communications Environment (SPLICE). This project will maintain the current level of fleet logistics support in the 1980's. Funding will provide ADP equipment to support the Chief of Naval Personnel with minicomputers, terminals, and printers to provide automated support to the world-wide network of military Pay/Personnel Offices by assisting in the performance of field level pay and personnel functions and by providing timely accurate reporting to the central pay and personnel systems. Also requested is funding to automate the collection, processing and reporting of civilian personnel data from local civilian personnel offices to Navy management and other federal agencies. In accordance with the recommendations of the President's Private Sector Survey on Cost Control, resources are requested to upgrade computers at Navy Inventory Control Points.

The Computer Acquisition Program reflects significant growth over fiscal year 1984 ($187.6 million) for several reasons. First, ADP equipment is becoming more and more a part of all programs, from maintenance activities to project management. During the budget review process, ADP funds from other programs are transfered to the CAP line, creating apparent growth. Second, Congressional emphasis on procurement vice leasing of ADP equipment creates growth by inclusion of equipment in the CAP which formerly would have been leased. Finally, the fiscal year 1984 Congressional reduction to CAP funds meant that those ADP programs not funded in fiscal year 1984 are now included in the fiscal year 1985 request. It is important that this critical budget line be reviewed in the context of these upward forces on funding requirements.

Funds of $20.9 million are requested for the productivity programs to purchase, install, and demonstrate improved general purpose equipment, tools, and procedures. The objective of productivity investments is to invest in modern equipment, methods and labor savings devices to reduce labor intensive and costly operations in government.

In summary, many equipments financed by this appropriation support both the Fleet Modernization Program and the shore establishments by which the material and equipment readiness of our Fleet units is maintained or improved.

Mr. Chairman, this completes my prepared statement. I hope that this discussion provides a better understanding of the capability improvements which the Navy hopes to achieve through the execution of the fiscal year 1985 Other Procurement, Navy budget.

Senator COHEN. Thank you very much, Admiral.

What we will do now is call Congressman Smith to the witness table so that he can return to the House, if he wishes to do so quickly. He is welcome, of course, to stay as long as he would like.

Then we will have the Navy respond to some of the questions that I believe Congressman Smith is going to raise.

[Pause.]

Congressman Smith, before you begin, I would like to make a couple of comments.

I think you have been successful in raising a number of questions which were important to raise. I don't think that any system we procure ought to go unchallenged, certainly not by Members of Congress. Any major system ought to be subjected to the closest of scrutiny, particularly in view of the amount of money that is involved.

So, I want to commend you for raising a number of issues of this particular ship.

Also, at this particular point, I have been requested, on behalf of Senator Hart, who is the ranking minority member of the subcommittee, to pose a number of questions. I would pose them before you speak because I have looked at your opening statement—and perhaps you might be able to summarize some of that—and I am satisfied that you anticipated and will address many of these questions.

In looking at the questions, I find that some of them fall into the classic definition of "leading questions," since they assume certain answers. While lawyers may like to lead witnesses to definite conclusions, I am not sure what the actual answers are going to be.

But let me at least suggest these questions to you and perhaps you could address them as you move through your testimony.

First of all, he asks about your military background and whether or not you are familiar with the tactics of aircraft attacking ships. What is your idea of the best way to attack a ship like the *Aegis*?

Has the operational testing of *Aegis* included such attacks?

Have you discussed the matter of the need for more operational testing of *Aegis* with anyone in the Office of Testing and Evaluation?

What did they think about the need for more operational testing?

What did they say about the Navy's plans for future operational testing of *Aegis*?

Was the Navy cooperative in allowing you to view the actual operational test results?

Is it true that, when the Navy presented you with the April operational test report, the copy given to you was missing an important page?

Is it also true that at one point in your attempt to view the April test results, your office was told that a committee of admirals had convened and voted that you should not be allowed to see the report?

To your knowledge, was the Secretary of the Navy or the Chief of Naval Operations involved in that committee or that decision?

Did either of these persons know the test report given to you would be missing an essential page?

Do you have any idea why the Navy would be trying to prevent you from obtaining operational testing information?

I will assume that you will cover most of those questions during the course of your testimony.

I will also say, Congressman Smith, that I have read reports that there are those powerful Members of the Senate who are exercising a heavy hand, namely yours truly, trying to suppress the questions that you would like to raise. Just so that the record is very clear, you have been on the witness list since these hearings were scheduled, and, as you know, I have made every attempt to make sure that you have a total ventilation of the issues that you are going to be raising today.

STATEMENT OF HON. DENNY SMITH, A U.S. REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Representative SMITH. Thank you, Senator Cohen and Senator Stennis.

It is a real opportunity and privilege to be here this morning. I realize it is a little unusual to be accorded this opportunity. I do not serve on the Armed Services Committee in the House of Representatives. I got into a position a couple of years ago where I felt, as an individual Member of the House, that I should look into some of the programs. I have been a strong, strong supporter for the military and for the need of a continued buildup of the national defense capability of this country.

Since I arrived here in January of 1981, I think we have seen an erosion of a consensus that certainly was alive and well in 1980, that the citizens of this country needed, and felt they needed, after the Desert I fiasco in Iran, when the military was kind of hamstrung by the politicians, a buildup for purposes of defending our people and our society throughout the world.

I think that my votes have been a consistent vote for a strong defense and, therefore, looking into this I have been a bit surprised by some of the things I have found.

I will try to summarize what has occurred in the last few months.

I did pick out a few weapons systems to try to see what I felt the Department of Defense and specific services were doing in those areas. In this instance, *Aegis* came to mind from a "Wall Street Journal" article on June 30, in which Admiral Meyer had made the statement that we had a *Ticonderoga* which was attacked 13 times by drones that popped up over the horizon, dived out of the upper atmosphere, zig-zagged, and attempted to jam the ship's powerful radars. All 13, according to the Navy, were shot down by *Ticonderoga* missiles.

So, it was a natural to pick this out and see what we had.

I wrote to the Secretary of the Navy and the Chief of Naval Operations and asked if I could have their opinion on the ship. The response was pretty much that all the test requirements had been met and this was a quantum leap forward.

So, we continued, and I asked to see the operational evaluation test results which had been run in April, 1983 and again in September, 1983. When we got the April results, the numbers clearly were not a complete match with what had been publicly stated. The advertising and everything else had indicated that it had matched everything it was supposed to do.

In fact, we found that the numbers, which were in a classified document—in particular, I think it is page A-29 out of the Appendix of the test results—showed very clearly that there is a mismatch between the public statements of the Navy and the operational evaluation area and what we finally have had.

Let me make really clear one thing: I am not here to cancel the *Aegis* program. I am here to be sure that the sailors that are going to have to utilize that ship and the taxpayer who is going to pay for that ship are represented by a Member of Congress who is trying to be sure that we are buying the best military equipment that we have.

So, in line with this, after a number of months of working with these things, on February 3, I wrote a letter to all of my colleagues who were serving on the Armed Services and Appropriations Committees asking that they, and you two gentlemen, in particular, look into page A-29 and satisfy yourselves that the Navy's performance requirements were being met in the *Aegis* testing.

I think when you have a program that is going to cost $80 to $100 billion over the next few years and will have contemporaries of my 10-year-old son serving on them 20 to 30 years from now, we need to be sure that we are doing the right thing for the American sailor and the American taxpayer.

That has been my effort.

We need to buy the best combat equipment that we can, equipment that is fully tested. I think the difference between the operational tests and the developmental tests has never been clearly drawn by the Navy.

Clearly, the "Wall Street Journal" article was maintaining a situation of developmental tests. I would liken it to the batter's practice or to a skeet shoot where you are hollering "pull" for the guy to throw the clay pigeon up for you. Clearly, the people operating the system knew where the targets were coming from, what they were, what their presentation would look like, how big they would be in the radar, and so forth.

So, we need to make clear here that what I am talking about is not the total amount of developmental testing over the years, but the operational testing in a near-combat environment.

Now, realizing that we were restricted on frequencies, the numbers of targets cannot be anywhere near the 200 that the Navy advertises as being able to handle at the same time. They have to synthesize that with radar simulation at the antenna. Recognizing that that is not quite as good, it is as close as they can come.

I think we need more of the mass low altitude attack that would be faced by this kind of ship if you were in a combat position with an airplane. You are going to be on the water, as close as you can, and the Argentine pilots had as one of their greatest difficulties the salt spray on their windshield. At no time in these tests have we had those kinds of targets presented on a constant basis.

I think we do not necessarily need a supersonic test capability to find out whether they can hit something at 50 feet and below, as a piloted vehicle is going to be. And, if you want to look at it, we are in no different shape than we were, say, 40 years ago, when the kamikaze attacks took place on the fleets off Japan and Okinawa. The vehicles have been changed, and of course, the exercise has been talked about a great deal.

I do fully support the test which the Navy has now agreed to, to bring the *Ticonderoga* back from its present deployment and put it into a position where we will have another operational test. If the problems that have cropped up in the OPEVAL's both in April and

September of last year have been solved, I think that is great. I understand that there were problems with missiles. There were a number of problems that were picked up. That is the purpose of the operational evaluation, as we are well aware. There is absolutely no reason why the Navy should be hesitant in allowing this operational evaluation to go forward.

I think it is good. I have a letter, in fact, which is part of the testimony, which indicates that they will have another operational evaluation test conducted either in the latter part of April or the first part of May.

I have requested that I be allowed to see the operational test and will continue to try to negotiate that with the Navy. I do not think that is totally necessary, but I would like to see what they are going to do—crossing targets, low altitude targets, and I think we need to have many, many more targets.

When we are working with something where we are going to talk about 26 total ships with each ship in excess of $1.25 billion or somewhere in that area, we need to have that kind of result looked at. I think that the civilian leadership of this country needs to be certain that we are involved in just looking over their shoulders, as our responsibility requires.

I came here thinking that we probably ought not to go forward with any procurement or any decision to procure the DDG-51. But one of my concerns about the CG-47 class of cruiser is the aluminum armor. I think it is probably one of the most difficult things that we face. Given the problems that the Falklands war certainly highlighted, with the closeness of aluminum to magnesium, we perhaps ought to buy the DDG-51 and stop procurement of the cruiser class.

But I would leave that to the experts in this area and certainly to you people who have to look over this program.

My whole effort is to try to be sure that we are testing this project.

[The prepared statement of Representative Smith follows:]

PREPARED STATEMENT OF CONGRESSMAN DENNY SMITH (R-OREGON)

Mr. Chairman,

Let me begin by thanking you for providing me the opportunity to appear before your Subcommittee today. I realize that a great deal of attention has been focused recently on the subject that I am about to address, and I sincerely appreciate the efforts made by you on behalf of the Subcommittee to give this matter careful congressional scrutiny for the benefit of the United States Navy and the American taxpayers.

Mr. Chairman, I am counted among the Administration's strongest supporters for a national defense second-to-none. My voting record on national defense and security issues since coming to Congress in 1981 is evidence of this. I have supported a strong American defense because I know the military threat posed by the Soviet Union has increased by leaps and bounds over the past two decades, and it is a threat to be taken seriously.

I am certain that the relentless Soviet offensive build-up poses a direct threat to our national security and very way of life. Should we not act now to increase our defense capability, we will only be inviting greater danger for the security and freedom of our children whom we have the duty to protect. This Administration, this Congress, have the awesome responsibility of ensuring we are adequately prepared to defend American interests from a dynamic Soviet threat at any time, anywhere, around the world.

This challenge cannot and will not be met without the support of the American people. This Administration had that support for a strong defense in 1980 when millions of Americans sent a strong message to Washington, D.C. That message was clear: Never again should our government leadership, presiding over the strongest nation on the face of the earth, allow our military forces to be humiliated in the manner they were during the American Embassy hostage crisis and "Desert One" operation in Iran.

Since that time, the American people have supported a Congress that has increased our military budget by $128 billion over the FY 1980 level. I believe that the American people are now beginning to question, and rightfully so, just what it is they are getting for their hard-earned tax dollars dedicated to the defense budget. There is no doubt that the Department of Defense has taken a number of initiatives and embarked on a number of weapons programs that will place our national defense on a sounder footing. The esprit de corps among our fighting men has been reinstilled. But the horror stories of faulty weapon systems, huge cost overruns, contractor fraud, skyrocketing weapons costs, exhorbitant prices for spare parts, and inept procurement practices have run rampant across this country and are now common knowledge among American taxpayers of all ages. Like it or not, we are fast losing the consensus we once had for the need to strengthen the military in this country, and much of the blame for that dying resolve can be layed at the Congress' own doorstep.

While the subject of my testimony centers around the testing of one particular weapon system, it is my hope that our efforts here today will in some small way help to rebuild the consensus among the American people for the need to maintain a strong national defense, a consensus vital to our nation's survival.

During the summer of 1983, I decided to take a hard look at the defense budget to determine what specific policy I could urge the Administration to take to promote more responsible management of weapons programs receiving tough, public scrutiny. The AEGIS Weapon System was among those weapons chosen.

PRESS REPORTS RAISE QUESTIONS

A front page article from the June 30, 1983 WALL STREET JOURNAL concerning the U.S.S. TICONDEROGA caught my attention. As a former F-4 fighter/bomber pilot for the Air Force familiar with radar technology and the tactics of air attack, I was amazed to read of the ship's reported success in downing thirteen of thirteen targets presented as attacks on the fleet. These results were particularly amazing to me in light of the reading I had done with respect to the success the Argentinian Air Force achieved using low level, air launched Anti-Ship Missile (ASM) attacks against the British fleet in the Falkland Islands War. I took this opportunity to write to Secretary of the Navy Lehman (ATTACHMENT 1) and CNO Watkins (ATTACHMENT 2) to ascertain their assessment of the TICONDEROGA's operational test performance to date.

THE NAVY'S RESPONSE

The responses I received from Secretary Lehman and CNO Watkins (ATTACHMENTS 3 & 4) stated that "extensive operational testing (of the TICONDEROGA) has continued since commissioning and all operational requirements have been met or exceeded," and that the TICONDEROGA provided "a quantum leap forward in the defense in depth capability of our carrier battle groups."

MY REQUEST TO VIEW THE EVIDENCE

On October 14, 1983, I requested the Navy to forward to me a copy of the OPEVAL report from the April, 1983 operational tests performed on the TICONDEROGA.

Had I known at the time that my simple request to view the OPEVAL report documenting this supposed "quantum leap forward" of our defenses would be viewed by the Navy as an opening of an enormous "Pandora's box", I might have requested a personal meeting with the Secretary of the Navy or Chief of Naval Operations for a personal explanation of their statements on operational testing.

TEST RESULTS

Instead, I took as fact their glowing reports of operational test performance of TICONDEROGA and requested to view the specific test results. It was then that I discovered that the TICONDEROGA had failed miserably against ASM attacks during the April, 1983 Operational Tests. While I will not mention specific test results, I can say that the results of the tests as relayed to me revealed a serious weakness or inability of the weapon system during the first full-scale OPEVAL test, to counter sea-skimming ASM targets presented as threats to the fleet. More importantly, I was alarmed to see that the TICONDEROGA had not been tested in an operational, at-sea environment, against live targets posed as saturation, low level attacks on the fleet.

ADDITIONAL OPERATIONAL TESTS REVEALED

I then decided to meet personally with Deputy Secretary Thayer to discuss what actions I believed it was imperative for the DoD to take to ensure that adequate testing was performed on the

AEGIS Weapons System. While Deputy Secretary Thayer appeared receptive to the need for more testing, he resigned from office before the case for more stringent testing could be further advanced. My suggestions to Deputy Secretary Thayer for further testing of the AEGIS Weapon System are also included (ATTACHMENT 5).

In January, 1984 I was given the opportunity to view the results of the September, 1983 OPEVAL Report. Again, I will abstain from going into the detail of the specific test results. The Navy has made public the actual September OPEVAL test results, results in which the TICONDEROGA's performance against ASM targets was as dismal as in April, 1983.

MY PURPOSE IN TESTIFYING

Mr. Chairman, let me make it very clear why I chose to testify before your Subcommittee today. I am not here to call for the wholesale cancellation of the AEGIS Weapon System program. In my view, such a move at this point would be ludicrous. The Navy has invested billions of dollars and millions of man hours in the AEGIS program and I know full well that the Navy is relying on this weapon as the key to their future in-depth protection of our entire surface fleet.

I am not here to say that the AEGIS Weapon System is a failure or will never work. Contrary to the Secretary of the Navy's remarks on this subject, I have never stated publicly or privately that the AEGIS Weapon System "doesn't work." Those are the Navy Secretary's words, not mine.

I am here to state and reiterate what I have said all along: The AEGIS Weapon System has not proven, in a full scale

OPERATIONAL testing environment, to be an effective shield, as the Navy has claimed it is, against sea-skimming and saturation target attacks posed as threats to the fleet.

A "Dear Colleague" dated February 3, 1984 explains this (see ATTACHMENT 5A). I stand here with the Operational Test results in hand as evidence of this and I challenge any employee of the United States Navy to refute the Navy's own documents.

DEVELOPMENTAL vs. OPERATIONAL TESTS

Mr. Chairman, I know I don't need to tell you of the tremendous difference between developmental and operational tests as they relate to the judgment of a weapon's performance. But I do believe that this fundamental point needs to be defined here for the sake of a number of officials in the Navy who have persisted in attempting to confuse the Congress and the public with a mismatch between the two.

"Developmental" tests are precisely what they imply. Tests conducted to test the development and engineering design of an evolving weapon system or a component of that weapon system in a controlled environment, one unlike the conditions the weapon will be called upon to face during the chaos of actual combat.

Developmental tests are an absolute necessity in judging the suitability of a specific weapon for battle, most particularly for those weapons of a complex and complicated nature. There is no doubt that the Navy has done an extraordinary amount of DEVELOPMENTAL testing on the AEGIS Weapon System during the last decade. The Navy is to be commended for the intense efforts they have undertaken in DEVELOPMENTAL tests to get this weapon system underway. I am convinced that the Navy has indeed spent the hours it claims in the laboratory, at its test facility, on its test platform simulating through the use of computer technology a number of scenarios to test the system. Their efforts in the area of DEVELOPMENTAL testing are not in question here.

OPERATIONAL testing is an extremely different story. During OPERATIONAL tests, as in the case of the TICONDEROGA, all the engineers, contractors, scientists are escorted from the ship and the entire system is taken to sea to be tested in a rigorous combat environment, one that approximates as closely as possible the conditions the ship and crew would face in actual war. Perhaps the most useful analogy I can draw here is that the difference between operational and developmental testing is akin to the difference between batting practice before a baseball game begins and the actual game itself.

All the evidence presented to me has me convinced that the AEGIS Weapon System has done a credible job in the batter's box before the game but has struck our during its first two times at bat. And it's only during the game, during OPERATIONAL tests, that your hits really count.

But there has been a conscious effort on the part of the Navy in discussing the AEGIS Weapon System's test results to blur the distinction between developmental and operational test results. The Navy has been more than willing to pass on to me the results of well-rehearsed, DEVELOPMENTAL tests (see ATTACHMENT 6) but has obviously been less forthcoming with OPERATIONAL test results. When the press was able to obtain the actual operational test results, the Navy Secretary responded to charges the ship's missile system performed poorly by combining the TICONDEROGA's developmental and operational test results, stating that the system had only "failed in 19 of 55 tests" against mock missile attacks. The Navy Secretary went on to pose the question of the effect such press reports "would do to the honesty of the testing system." While we are on the subject of the "honesty of the testing system," I might also pose this question: Why is it the Navy rushes to publicize the well-rehearsed DEVELOPMENTAL test results while shielding the lackluster to poor results of OPERATIONAL tests behind a secret classification?

THE NEED FOR MORE STRINGENT OPERATIONAL TESTING

I should state here that it is not simply the poor operational test results achieved by the AEGIS Weapon System that has me concerned. I am more alarmed by the dearth of operational tests performed on the weapon system thus far, most particularly in light of the fact that the Navy has requested, and the Congress approved, thirteen AEGIS class cruisers to date.

While I can understand the lengthy construction time alloted for ships of this size, I find it puzzling, at best, to understand why the Congress was asked to authorize the construction of eight AEGIS class cruisers before the Navy had performed the first full-scale, at-sea OPEVAL of the TICONDEROGA's performance in

April, 1983. I am not alone in my opinion in this regard:

-A 1981 audit by the Office of the Inspector General at the Department of Defense stated clearly that "test documentation did not support either the initial or follow-on procurement" of the CG-47 AEGIS class ship.

-Derek J. Vander Schaaf, Deputy Inspector General at the DoD, testified before the House Committee on Government Affairs in June, 1983 stating that the Navy's CG-47 AEGIS class ship was a prime example in which operational testing "was unduly constrained" and that the problems encountered demonstrated "the need to defer or constrain production decisions when operational testing has not been completed." Vander Schaaf also stated in testimony that "unless operational testing is conducted after required design changes have been made to developmental test prototypes, little improvement is likely in assuring that the products delivered to operating units meet their performance goals, are suitable for combat use and are worth their cost from the point of initial deployment to phaseout." Vander Schaaf pointed to the CG-47 class ship as an example stating that the program "had not matured to the levels required by the program acquisition strategy and test plans" and that the Navy "never made independent tests and evaluations of some first-generation subsystems" planned for the lead ship. Vander Schaaf also stated that the commitment by the Navy to produce eight AEGIS ships before sea trials was "excessive."

-In a report prepared for the Defense Systems Management College by Booz-Allen & Hamilton, Inc. in October, 1981 entitled "The Relationship Between Adequacy of Test and Evaluation Data and DSARC Decisions," the following was stated: "Residual concerns (of the AEGIS Weapon System) were that, in reality, only a small portion of the entire AEGIS Weapon System had been tested and that numerous questions remained unanswered. Missing pieces included full coverage from the SPY-1 radar, key software, elements of the command and control system. In addition, DDT&E observed that in spite of the progress, testing to date was inadequate to assess the system in a realistic threat environment. In light of all these inadequacies, it may be surprising that the DSARC recommended that AEGIS proceed into full production . . . The major opposition to production of the AEGIS came from the ASD (PA&E) who was given specific responsibility within OSD for OT&E shortly after this DSARC. PA&E was concerned that there was insufficient evidence that AEGIS would function effectively in a high threat environment."

-A February 28, 1980 GAO report (C-PSAD-80-18) found the following: "The (AEGIS) project office knew that software reliability would cause AEGIS to fall short of operational test requirements. In assessing the importance of software reliability at this stage of the development program, the project office decided the cost to meet operational test reliability requirements would be excessive. Nevertheless, the AEGIS Weapon System was certified as ready for Operational Test IIIB.
Operational testing was conducted and software reliability was again unsatisfactory. Although improvements were made, preliminary test results show the software was able to achieve a mean time between failures of ---------- (CONFIDENTIAL) hours as compared to a threshold of 5 hours. The Navy and its contractor believe the software reliability is much better than expected in this development stage and consider it satisfactory for development. However, the contractor and the Navy know that the current level of software reliability would be unsatisfactory for a deployed system, but expect to meet reliability of goals before AEGIS is deployed in 1983.

-A February 22, 1983 GAO report (GAO/C-MASAD-83-11) on the status of the AEGIS program stated: OT&E was first performed on a developmental AEGIS model aboard the USS Norton Sound, a Navy test ship, in June, 1977. This system did not have the full number of illumination radars, transmitters, or antenna arrays. The Navy did fly aircraft and target vehicles against the system which detected and tracked the targets and directed missile firings at target vehicles. But, neither target vehicles nor electronic countermeasures were representative of existing or projected threats. Nevertheless, OPTEVFOR concluded that the system was acceptable for production and had potential for effective service use...Consequently, the AEGIS combat system was not adequately tested before it was commissioned in January, 1983. The Secretary of Defense should closely monitor the Navy's February 1983 review of its proposal to fully test AEGIS.

I invite the Subcommittee to take a particularly close look at the statements made by the GAO in their February 22, 1983 report on the AEGIS Weapon System. The GAO report implies in a number of classified references, that the decision to proceed with the production of the AEGIS Weapon System should weigh heavily on the outcome of the operational tests performed in 1983.

NAVY SCHEDULES ANOTHER TEST

In February, 1983, I received a letter from CNO Watkins (ATTACHMENT 7) stating the following:

> "To insure that the problems discovered during OPEVAL have been adequately addressed and corrected, an additional test period appears warranted for the AEGIS Weapon System. Accordingly, my staff is developing an addendum to the AEGIS test plan which will provide for an additional operational evaluation of AEGIS' performance.

I am most pleased to see that the Navy has decided to conduct an additional OPERATIONAL test of the TICONDEROGA. The Navy should be commended for calling for this additional test and they have my complete support in this effort. In fact, when the Navy sent me an invitation to visit the TICONDEROGA in action, I readily accepted (see ATTACHMENT 8).

I requested the Navy to to come be present during their upcoming OPERATIONAL test scheduled for late, April, 1984 so that I could observe the operational performance of the TICONDEROGA against sea-skimming and saturation attacks posed as threats to the fleet in a "combat" scenario, should the Navy perform this type of test.

Attached is the Navy's response (ATTACHMENT 9). I will be allowed, I am told, to view "a developmental test or fleet exercise in which missiles will be fired," not an operational test. Again, this is another way of saying that the Navy would be pleased to have me attend a portion of their "batting" practice, but will not allow me to view the actual baseball game.

THE NAVY'S RECENT STATEMENTS

Since the actual results of the 1983 OPERATIONAL tests were leaked to the public, it is interesting to see that the Navy has continued to stonewall any criticism of the AEGIS program, even in the face of the hard evidence documenting a lack of sufficient and successful operational testing information. The Navy's call for an additional operational test, one not previously planned, indicates to me an admission of facts relating to a lack of successful testing that they continue to publicly deny.

The following examples illustrate this point:

> -Admiral James D. Watkins, chief of naval operations, . . . acknowledged that the missile system is having a problem "with one element at the maximum edge of the envelope," namely countering supersonic missiles coming in at very low altitudes, but he said the Navy is confident of solving that problem before the Soviet threat actually develops.
> DEFENSE DAILY, March 7, 1984 Page 36
>
> -Vice Admiral Robert L. Walters explained to the House Seapower Subcommittee that during operational evaluation of the CG-47 system in April and September of 1983 . . . The problems concerning the AEGIS System and human error have been corrected . . . The system's failures involved software and that too has been corrected . . . Walters acknowledged "We don't know if we understand all the missile problems" and that the AEGIS "did not do as well as we would have wished."
> DEFENSE DAILY, March 1, 1984 Page 2
>
> -At one point, Lehman said that AEGIS "is working extremely well." Yet he also said, "AEGIS has not yet reached its full potential. It's going to take several more years of debugging and working out the kinks."
> BOSTON GLOBE, February 9, 1984
>
> -Navy Secretary John F. Lehman, Jr. acknowledged in a meeting with reporters yesterday that "actual missile kills . . . have not been that impressive."
> THE WASHINGTON POST, February 15, 1984 Page A-14
>
> -In the case of TICONDEROGA's OPEVAL, missile firing tests revealed discrepancies in the areas of system response, human performance, and missile performance. Problems related to the weapon system and human error were easily corrected and they have not recurred."
> Navy Secretary Lehman, February 10, 1984

Inherent in nearly all these statements is the notion that the Navy has either fixed the problems associated with the 1983 OPEVALs or intends to identify and solve system problems that arise in the future.

Mr. Chairman, I am here today to pose this question: How is it that the Navy expects to identify existing and future problems associated with the AEGIS Weapon System, verify their correction, AND successfully prove the system can engage low level, saturation attacks presented as targets to the AEGIS Weapon System?

The answer is simple and obvious. Such a goal can only be achieved through more realistic and stringent OPERATIONAL testing. That is the bottom line. The Navy contends that all the operational problems that surfaced in 1983 have been corrected, and that their confidence in the system has never been greater.

But the Congress, and the Navy, need more hard data from operational testing of the AEGIS Weapon System to make an educated and accurate assessment of the system's ability to defeat low level, saturation ASM attacks in a combat environment. And we should have that data before committing ourselves to the production of any more AEGIS class ships tasked to protect the lives of our naval task forces. My concern all along in this effort has been to ensure that our taxpayers paying the bill and the sailors using this system will get the best, most proven technology -- equipment tested strenuously not only in laboratory situations, but in environments as close to combat as we can provide.

FUTURE TESTING

Mr. Chairman, I invite your Subcommittee to take a hard look at the future test schedule for the AEGIS Weapon System. I have viewed that schedule and am convinced the Navy needs to test the system in an operational environment against the real threat facing our fleet sooner and more strenuously than they intend, that threat being low level missile and kamikaze attacks similar to what the British faced in the Falkland Islands War.

There is no question that the Navy has in its inventory a number of different types of targets to adequately test against this threat. I believe it is important for the Congress to urge the Navy to use them. Again, I would like to point to the suggestions I made to Deputy Secretary Thayer in this regard (ATTACHMENT 5). Those suggestions are as follows:

1. Procure enough targets to accomplish at least 200 missile intercepts. Several such targets that adequately represent threats to our fleet are available and should be purchased without further delay.
2. At least one-half of the shots should be fired at low altitude targets. One-half of these at fifty feet or less and one-half at thirty feet or less.
3. At least one-fourth of the shots should be fired at offset and maneuverable targets to simulate the protection of other ships in the fleet.
4. At least one-fourth of the shots should be fired at multiple crossing tracked targets presented as saturation attacks on the fleet.

In response to my suggestions that the Navy should acquire more such low level targets, they have stated that they have not been able to test against a vehicle representing what they perceive as one of their greatest threats, the Supersonic Low Altitude Target (SLAT), and will not be able to do so until FY 1989 when the SLAT is operational. While I am chagrined with the lengthy waiting time for an operational SLAT for testing, I intend to fully support the Navy's efforts in this area.

But my letter of January 30, 1984 to CNO Watkins reflects a concern (see ATTACHMENT 10) that the AEGIS Weapon System has not proved effective, in operational tests, against the subsonic, low altitude targets the Navy currently has utilized. To cite an absence of SLAT vehicles until FY 1989 as justification for further procurement without sufficient operational testing until that time is not responsible.

A SOURCE FOR TARGETS

Obviously, a rigorous test program such as the one I have suggested will require the procurement of a number of target test vehicles. It makes absolutely no difference to me where the Navy purchases its targets. My point is that in order to perform enough tests to adequately assess the AEGIS Weapon System's performance, the Navy is going to need more targets that can simulate the real and present threat to our fleets.

Such a test program is going to require funding and I am in full support of this needed funding.

ADDITIONAL TEST CONCERNS

I am also extremely concerned that the Navy intensify its efforts to test against the AEGIS class ships' vulnerability to Anti-Radiation Missiles (ARM's). The Navy has vehemently denied that the AEGIS radar serves as a dangerous electronic beacon that could attract enemy ARM's. It is my hope that they undertake an operational test program to prove this.

The use of aluminum monoblock armor for the superstructure of AEGIS class cruisers has also left me with some questions. There was considerable conjecture by weapons analysts that the aluminum superstructures of some of the British ships lost during the Falkland Islands War may have created an insurmountable obstacle to effective damage control. It is also a fact that there are no weight savings associated with aluminum when compared to steel for a given level of ballistic protection. I believe it important for the Navy to test and quantify the risks associated with damage control to ensure that the decision to incorporate aluminum superstructures on our ships is a sound decision based on combat requirements.

CONCLUSIONS

Mr. Chairman, I think it is obvious by now that my intent in testifying before your Subcommittee today is to express my strong desire to see that the Navy begin implementing, as soon as possible, a more rigorous operational test program on the AEGIS Weapon System in order to ensure the system is truly an effective combatant against low level, saturation ASM threats to our fleet. I believe that such a testing program will serve the best interests of the American taxpayers and our sailors at sea who deserve the best combat equipment this nation can afford.

I thank you once again for the opportunity to appear before your Subcommittee today and I stand ready to assist you in the difficult task of insuring our nation fields a fighting force that is truly second-to-none.

DENNY SMITH
5TH DISTRICT, OREGON

WASHINGTON ADDRESS:
1213 LONGWORTH HOUSE OFFICE BUILDING
(202) 225-5711

SALEM ADDRESS:
4035 12TH S.E. [illegible]
P.O. BOX 13089
SALEM, OREGON 97309
(503) 399-5756

Congress of the United States
House of Representatives
Washington, D.C. 20515

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
VETERANS' AFFAIRS

ATTACHMENT 1

September 12, 1983

The Honorable John Lehman
Secretary of the Navy
The Pentagon
Washington, D.C. 20350

Dear Secretary Lehman:

I can say without hesitation that my first two terms in office reflect a strong support for the Administration's efforts to field a fighting force of unquestioned strength.

I intend to continue that support and, in that regard, have undertaken an intensive study during the past few months to determine what further actions we might take to ensure our armed forces remain second-to-none. With annual federal budget deficits now predicted to spiral above the $200 billion mark, our task of determining how we maintain a credible defense at the least possible cost becomes an even greater challenge.

In reviewing those weapons systems the Navy has deemed crucial to its mission, one program in particular appears to be taking the lead both in high cost and high priority: The CG-47 Aegis Cruiser. I understand the Navy plans to procure twenty-four Aegis cruisers at an estimated cost of $1.16 billion each. Total program cost through FY 1988 would therefore approximate $28 billion. To date, the Navy has spent $9.6 billion on the Aegis program and commissioned one CG-47, the U.S.S. Ticonderoga.

As I am sure you are well aware, the Aegis system is no stranger to controversy. The CG-47 faces a formidable task in acting as the "shield" for an entire carrier battle group. I realize, as with most major weapons systems of this size, complexity, and importance, that such programs carry with them a constituency of friend and foe alike.

But I have become increasingly concerned over recent conflicting reports as to the CG-47's performance. During the course of my research, I have been dismayed over the number of accounts that have taken the CG-47 to task as representative of an untested, unproven technology, unable to withstand the chaos of combat. Yet more recently, I was extremely pleased to read in press accounts that the Ticonderoga was successful this spring in downing thirteen of thirteen drones simulating threats to the fleet.

The Honorable John Lehman
Page 2

Mr. Secretary, can you give me your personal assurance as the senior civilian authority of the U.S. Navy that the Aegis cruiser program has undergone, with success, the adequate and realistic testing necessary to warrant further production of this ship?

Thank you in advance for your prompt and personal attention to this request. As an ardent supporter of those programs essential to our national defense, I await your reply.

Best regards,

Denny Smith

Denny Smith
Member of Congress

DAS:jdh

DENNY SMITH
5th District, Oregon

Washington Address:
13 Longworth House Office Building
(202) 225-5711

Salem Address:
4035 12th S.E. #20
P.O. Box 13089
Salem, Oregon 97309
(503) 399-5756

Committees:
Interior and Insular Affairs
Veterans' Affairs

Congress of the United States
House of Representatives
Washington, D.C. 20515

ATTACHMENT 2

September 12, 1983

Admiral J.D. Watkins
Chief of Naval Operations
The Pentagon
Washington, D.C. 20350

Dear Admiral Watkins:

I am writing to you as the Chief Naval Officer of the U.S. Navy to get your confirmation as to the integrity of the CG-47 Aegis system. I have been presented with a number of conflicting reports during the past few months concerning the CG-47's performance and would like your assurance that the system is sound.

As a former military pilot familiar with radar technology, I have been dismayed over the number of accounts I have read recently taking the CG-47 to task as representative of an untested, unproven system, unable to withstand the rigor of combat. Yet more recently, I was pleased to learn that the U.S.S. Ticonderoga was successful during sea trials this spring in defending itself against thirteen of thirteen drones simulating threats to the fleet.

Admiral Watkins, can you give me your personal assurance that the Aegis cruiser program has undergone, with success, the adequate and realistic testing necessary to warrant further production of this ship?

Thank you in advance for your prompt and personal attention to this request. As an ardent supporter of those programs essential to our national defense, I await your reply.

Best regards,

Denny Smith

Denny Smith
Member of Congress

DAS:jdh

THE SECRETARY OF THE NAVY
WASHINGTON, D. C. 20350

ATTACHMENT 3

11 October 1983

The Honorable Denny Smith
House of Representatives
Washington, D. C. 20515

Dear Mr. Smith:

I am responding to your recent letter in which you questioned the integrity of the AEGIS system and the results of operational testing of USS TICONDEROGA (CG-47).

Reports of inadequate testing of TICONDEROGA and its AEGIS system are not correct. AEGIS is the most carefully tested combat system ever built. Prior to TICONDEROGA's commissioning, we completed over 100,000 hours of successful testing, including three sea trials. Extensive operational testing has continued since commissioning and all operational requirements have been met or exceeded.

TICONDEROGA establishes an entirely new level of sea-borne anti-air warfare capability -- it is the first Navy ship designed to counter large scale anti-ship missile (ASM) attacks. The fast reaction time and high firepower of the AEGIS weapon system have proven successful in countering ASM threats in operational testing against the lowest flying and fastest targets available to the Fleet. TICONDEROGA, acting in concert with other battle forces, provides a quantum leap forward in the defense in depth capability of our carrier battle groups.

TICONDEROGA's success in recent battle group exercises affirms our full confidence in this ship and its AEGIS system. The capability TICONDEROGA provides is unmatched by any ship in the world. Further production is entirely justified by the ship's performance.

I appreciate your support of a strong Navy.

Sincerely,

John Lehman

ATTACHMENT 4

CHIEF OF NAVAL OPERATIONS

22 September 1983

Dear Mr. Smith,

I am responding to your recent letter in which you questioned the integrity of the AEGIS system and the results of operational testing of USS TICONDEROGA (CG-47).

I share your concern about allegations in the press that we have done inadequate testing of TICONDEROGA and its AEGIS system. These reports are simply not correct. Earlier this summer I had the opportunity to respond in some detail to Congressional concerns about TICONDEROGA, and I am enclosing a copy of that letter for your use.

TICONDEROGA's success in recent battle group exercises affirms my full confidence in this ship and its AEGIS system. The capability TICONDEROGA provides is unmatched by any ship in the world and you have my personal assurance further production is entirely justified by the ship's performance.

I appreciate your support of a strong Navy.

Sincerely,

JAMES D. WATKINS
Admiral, U. S. Navy

The Honorable Denny Smith
House of Representatives
Washington, D. C. 20515

ENNY SMITH
DISTRICT, OREGON

WASHINGTON ADDRESS:
HOUSE OFFICE BUILDING
(202) 225-5711

SALEM ADDRESS:
4035 12TH S.E. #20
P.O. BOX 13089
SALEM, OREGON 97309
(503) 399-5756

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
VETERANS' AFFAIRS

Congreſs of the United States
House of Representatives
Washington, D.C. 20515

ATTACHMENT 5

December 19, 1983

The Honorable Paul Thayer
Deputy Secretary of Defense
The Pentagon
Washington, D.C. 20301

Dear Paul

Your prompt reply to my questions concerning the Navy's Aegis program was greatly appreciated.

As you are aware, the initial production decision on the first Aegis class cruiser was made in 1978 during the previous Administration. Because of the long lead-time production for ships, our Administration took delivery on the ship in 1983, prior to any rigorous, at sea operational testing of the Aegis weapon system. To this date, the Navy has spent approximately $9.6 billion on the Aegis program, plans to procure 24 Aegis class cruisers, and intends to purchase at least 60 Aegis class destroyers in the future. The projected Aegis program cost is therefore likely to be in the $80-90 billion range.

Because of the enormous program cost involved, and in view of the poor results achieved from the dirth of operational tests performed thus far, our Administration has the opportunity to act responsibly by ensuring the Aegis system is indeed a program that merits our complete support.

I am suggesting that the Department of Defense commence immediately a rigorous operational test program designed to determine if the Aegis system aboard the U.S.S. TICONDEROGA can successfully meet its operational requirements. At a minimum, I would suggest you implement the following:

1. Procure enough sea skimmer type targets to accomplish at least 200 missile intercepts. Several such targets that adequately represent threats to our fleet are available and should be purchased without further delay.

2. At least one-half of the shots should be fired at low altitude missiles. One-half of these at fifty feet or less and one-half at thirty feet or less.

3. At least one-fourth of the shots should be fired at offset and maneuverable targets to simulate the protection of other ships in the fleet.

4. At least one-fourth of the shots should be fired at

The Honorable Paul Thayer
Page 2

multiple crossing tracked targets presented as saturation attacks on the fleet.

I fully realize the cost associated with such a testing program. I'm sure that critics of such a rigorous testing program would argue that it is prohibitively expensive to fully test the Aegis system in an operational environment. In my view, the Aegis system is too expensive not to test.

I will be more than happy to work with you, Navy officials, and my colleagues in Congress to see that such an operational testing program becomes a reality.

Please let me hear from you in this regard. Your's for a strong defense,

Best personal regards,

Denny

Denny Smith
Member of Congress

DAS:jdh

.NNY SMITH
[illegible] DISTRICT, OREGON

WASHINGTON ADDRESS:
LONGWORTH HOUSE OFFICE BUILDING
(202) 225-5711

SALEM ADDRESS:
4035 12TH S.E. #[illegible]
P.O. BOX 13089
SALEM, OREGON 97309
(503) 399-5756

Congress of the United States
House of Representatives
Washington, D.C. 20515

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
VETERANS' AFFAIRS

ATTACHMENT 5A

February 3, 1984

Dear Colleague:

My concern for the safety of our sailors off the coast of Lebanon and for the American taxpayers paying the price of our defense budget prompts me to write you on their behalf.

Five months have passed since I began investigating the operational performance of the USS TICONDEROGA. I have had the opportunity to view first-hand the operational test results stemming from the April, 1983 and September, 1983 tests of the Aegis system's performance. All the evidence presented to me thus far has me concerned that a serious mismatch exists between the Navy's publicly stated performance of the USS TICONDEROGA (see attached) and the Navy's own test results as revealed in their secret Operational Evaluation reports.

The operational tests performed to date clearly indicate that the Aegis system, advertised as the "shield" of the fleet, has fallen far short of its expected capabilities in countering Anti-Ship Missile (ASM) threats to our surface ships. In particular, the operational tests reveal a serious lack of successful testing against saturation attacks and sea skimming targets similar to the Exocet missile used successfully by the Argentines during the Falkland Islands war. I urge you to review a copy of the September operational test report of the USS TICONDEROGA and study the index of test results as listed on Table 1-1, Page A-29.

Because of my concern for the continuing erosion of the consensus in this nation for a strong national defense, I must question the propriety of moving full speed ahead with procurement of the Aegis system until it can be successfully and conclusively proven in rigorous operational tests. Current DoD plans call for spending $80+ billion on Aegis class ships. It is my hope that Congress acts in a responsible manner by ensuring programs of such enormous cost are properly tested. At a minimum, I suggest you consider a FY 1985 budget plan that will make future authorizations for the Aegis program contingent on the system's ability to meet, in operational tests, the Navy's own operational requirements.

Best personal regards,

Denny

Denny Smith
Member of Congress

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO

3 December 1983

The Honorable Denny Smith
House of Representatives
Washington, D.C. 20515

ATTACHMENT 6

Dear Mr. Smith:

This letter responds to your request for information concerning the operational evaluation of USS TICONDEROGA (CG 47).

The report on the second phase of operational testing, known as Follow-on Test and Evaluation (FOT&E), has not been completed by the Commander, Operational Test and Evaluation Force (COMOPTEVFOR). It will be forwarded in the next two weeks and I will provide you information on the results shortly thereafter.

The following is a brief synopsis of firings during the second Combat System Ship Qualification Trials which were conducted during the period 3-13 September 1983:

NUMBER OF TARGET PRESENTATIONS	MISSILES FIRED	MISSILE SUCCESSES
11	13	10

Firing data has not been formally evaluated and it is not yet possible to pinpoint reasons for the failures. I will provide you those data at a later date if you desire.

Sincerely,

Ronald J Hays

RONALD J. HAYS
ADMIRAL, U.S. NAVY
CHIEF OF NAVAL OPERATIONS
(ACTING)

ATTACHMENT 7

CHIEF OF NAVAL OPERATIONS

Ser 00/4S300051
7 February 1984

Dear Congressman Smith,

In your letter of January 30, 1984, you expressed extreme concern over the results achieved as well as the dearth of operational testing of USS TICONDEROGA (CG 47). I believe your concern is unfounded. The operational testing of USS TICONDEROGA was the most intense, short-of-war operational testing of a surface ship in the history of our Navy. The Commander, Operational Test and Evaluation Force stressed both system and crew to the limit. TICONDEROGA demonstrated formidable warfare capability under threat test environments that would have overwhelmed any other ship in the fleet today. A review of the reports of Operational Evaluation (OPEVAL) will show that TICONDEROGA met or exceeded twelve of thirteen specific objectives in the area of operational effectiveness and twelve of fourteen objectives in operational suitability.

The purpose of OPEVAL is to identify deficiencies. In fact, we expect to uncover deficiences and then establish an aggressive management program to correct them after the report is submitted to me. In the case of TICONDEROGA, this effort has been underway since April 1983. Target engagement failures were the primary OPEVAL deficiency and were due to one of three things: system failure, human error or missile malfunction. All six system failures occurred during April OPEVAL and all were corrected prior to the beginning of operational testing in September. There were no system failures in the September testing. Three of the four human errors occurred during September testing and were related to personnel failure to conduct a standard maintenance check after replacing transmitter tubes. These errors have been well documented and the experience has been incorporated in crew training. The fourth human error occurred in April when the Commanding Officer fired at an outbound HARPOON missile even though the AEGIS computer recommended "hold fire". The Commanding Officer felt he might get the HARPOON target and had to try. This was a sound tactical decision during a war-like scenario. The five missile failures were primarily due to fuzing problems. These problems are being corrected as a high priority effort in the STANDARD Missile Improvement Program.

The AEGIS test plan already includes additional operational testing as well as developmental testing and system qualification tests. I have included a detailed description of planned testing as an enclosure.

To ensure that the problems discovered during OPEVAL have been adequately addressed and corrected, an additional test period appears warranted for the AEGIS Weapon System. Accordingly, my staff is developing an addendum to the AEGIS test plan which will provide for an additional operational evaluation of AEGIS' performance. We will continue to provide information to the Congress on testing results as they are available.

Sincerely,

JAMES D. WATKINS
Admiral, U.S. Navy

The Honorable Denny Smith
House of Representatives
Washington, D.C. 20515

DENNY SMITH
5th District, Oregon

Washington Address:
1213 Longworth House Office Building
(202) [illegible]

Salem Address:
[illegible] 12th S.E. [illegible]
P.O. Box [illegible]
Salem, Oregon [illegible]
(503) [illegible]

Committees:
Interior and Insular Affairs
Veterans' Affairs

Congress of the United States
House of Representatives
Washington, D.C. 20515

ATTACHMENT 8

February 29, 1984

The Honorable John Lehman
Secretary of the Navy
The Pentagon
Washington, D.C. 20350

Dear Secretary Lehman:

I am in receipt of your letter of February 10, 1984 in which you disagree with my assessment that the AEGIS Weapon System should undergo more stringent operational testing before further committing ourselves to the program. After reviewing your remarks, it appears obvious that you intend to continue full speed ahead on procurement of the AEGIS system regardless of the dearth of operational test data available for analysis to date and regardless of the poor test results revealed in that data.

From all the evidence presented to me thus far, it is my judgment that the Congress should make any further authorizations for the AEGIS program contingent on the weapon system's ability to meet, in rigorous and extensive operational testing, the Navy's own expectations. It is my intention that the Congress provide the Navy the necessary funds to enact immediately an operational test program consisting of no less than the specifications outlined in my letter of December 19, 1983 to Deputy Secretary Thayer.

Because of my interest in remaining abreast of any further information you are able to provide with respect to the AEGIS Weapon System, I am only too happy to accept your invitation to visit the TICONDEROGA in order that I might view the system in operation first hand. I was recently informed by Admiral Watkins that "to ensure that the problems discovered during OPEVAL have been adequately addressed and corrected, an additional test period appears warranted for the AEGIS Weapon System." While Admiral Watkins has yet to respond to my request of February 9, 1984 to supply me with the dates and details of this proposed test, it is my desire that any visit your office can arrange for me will coincide with an operational test date in which the ship is tested against sea skimming, maneuverable, and saturation target attacks. Please contact my staff to make the necessary arrangements.

Best personal regards,

Denny Smith

Denny Smith
Member of Congress

DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
WASHINGTON DC 20350

ATTACHMENT 9

28 March 1934

The Honorable Denny Smith
House of Representatives
Washington, DC 20515

Dear Mr. Smith:

Because Secretary Lehman is on active duty for Reserve training, I am responding to your 29 February letter.

As reported to you in personal briefings as well as correspondence from Admiral Watkins and Secretary Lehman, TICONDEROGA demonstrated a formidable warfare capability during operational testing that would have completely overwhelmed any other ship, in any Navy, afloat today. A review of OPEVAL reports shows clearly she met or exceeded every objective in the Commander Operational Test and Evaluation Force (COMOPTEVFOR) test plan. The data obtained during actual missile firings was achieved under stress factors designed to identify areas that can be improved. The purpose of follow-on test and evaluation is to verify resolution of problems discovered during OPEVAL.

All operational testing is conducted by COMOPTEVFOR, Rear Admiral Carter, in accordance with a rigorous test plan developed by his organization. Specific test objectives and missile firing scenarios are prepared by his staff and are not revealed in advance to the ship. To ensure that Rear Admiral Carter is unencumbered in his ability to conduct an objective and thorough test neither those in the tested ship's chain of command nor visitors are permitted on board.

Because TICONDEROGA is now completing the deployed phase of her operating schedule, we will work with your office to arrange an underway visit in USS YORKTOWN (CG-48), to coincide with either a developmental test or fleet exercise in which missiles will be fired.

Sincerely,

Melvyn R. Paisley
Acting Secretary of the Navy

Y SMITH
[illegible], OREGON

WASHINGTON ADDRESS:
[illegible] HOUSE OFFICE BUILDING
(202) 225-5711

SALEM ADDRESS:
4035 12TH S.E. #55
P.O. BOX 13089
SALEM, OREGON 97309
(503) 399-5756

Congress of the United States
House of Representatives
Washington, D.C. 20515

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
VETERANS AFFAIRS

ATTACHMENT 10

January 30, 1984

Admiral James D. Watkins
Chief of Naval Operations
The Pentagon
Washington, D.C. 20350

Dear Admiral Watkins:

I have had the opportunity to view first-hand the operational test results stemming from the April, 1983 and September, 1983 tests of the USS TICONDEROGA. In light of the poor results achieved in the dirth of operational tests performed thus far, I am now extremely concerned with the speed and direction the Aegis program is taking.

My concern for the lives of our sailors at sea and for the American taxpayers asked to pay for this enormously expensive program prompt me to question the propriety of continuing full tilt with the Aegis system until it can be successfully and conclusively proven in rigorous operational tests.

I am fully aware that the Navy will not have a Supersonic Low Altitude Target (SLAT) in its inventory to completely test the Aegis system until 1989. While I am unhappy with the 1989 target date for availability of the SLAT, I am quite willing to support the continuation of the SLAT program in order that the Aegis system can be adequately tested against such projected threats to the fleet. But I am concerned, and the operational test results made available to me confirm this, that the Aegis system has fallen far short of its expected capabilities in countering threats of much smaller magnitude that are currently available to the fleet. Common sense dictates that the Aegis system be further tested in rigorous operational tests with targets, particularly low altitude targets, the Navy now has on hand.

In this regard, I must request that you forward to me a detailed schedule of the dates, including the number and types of target firings to be employed, of the operational tests planned for the USS TICONDEROGA in the future.

Best personal regards,

Denny

Denny Smith
Member of Congress

Senator COHEN. I would point out that the *Sheffield* had a steel superstructure, didn't it? That was the first ship to go down. So one of the lessons of the Falklands, too, was not whether ships should have aluminum or steel superstructures, but whether they have adequate air cover, which apparently they didn't in the Falklands.

Representative SMITH. Adequate air cover certainly is a factor. I think another factor that needs to be fully tested is the antiradiation missile. There has been some testing, as the Navy shared with me. But I think, certainly, we need to be sure that a wide frequency antiradiation missile cannot get inside this ship's circle, I guess you would say, in airplane terms, and knock it down.

I just would try to turn to some of the questions, if I have not already covered them, to see if I can answer them.

I did have a combat tour flying F-4's in Vietnam. Obviously the tactics have not changed a great deal.

Senator COHEN. Excuse me, but was your primary mission to attack land targets or air targets?

Representative SMITH. We were primarily working on land targets. But it was a similar situation. We did not have to worry so much about the sea spray so much as about the bugs on the windshield. It is a problem. If you get low, you are less of a target. Anybody who has been shot at is going to try to get as close as he can to safety. I think that that was well proven in the Falklands, with the multiple directional attacks and with low altitude, hugging the terrain as they came over after the British Navy.

What were those questions, specifically? Maybe I can run down through them. I don't want to take a lot of your time, Senator.

Senator COHEN. Have you made an analysis of the kinds of misses or errors that were made during the operational testing in April and September? There has been a lot of discussion about that in the papers. What were the human errors, what was malfunctioning, what were the fusing problems? Have you satisfied yourself that the human errors were corrected? In one case, for example, as I recall it, the captain was told by the system not to shoot because we can't hit the target, we can't take care of that one. The captain exercised his professional judgment and said, "I'll take a chance," and pushed the system beyond what the computer was saying it wouldn't do. That was scored as a miss.

On the other hand, he probably did the right thing under the circumstances.

Representative SMITH. I think under the circumstances that he did the right thing. Even when you factor that in, Senator, I think we find, number one, that there are not enough attacks that simulate the low altitude target. There are not enough crossing attacks.

I always talk about the fact that the Exocet or that type missile is a step-down type missile, or it will not be on the deck all the way in. But, certainly, even with an A-4, such as the Argentines used, with iron bombs, with which they had fusing problems, they were right on the deck.

I think the human errors, when they are taken out of the test, still show that there is a problem.

Another thing that has been brought up is that the standard Navy missile, which is utilized by the *Aegis,* is not the advanced Block II that will be utilized in the final version of this ship.

The fact of the matter is, if they were bad missiles, then I think it behooves the Navy in the April or May test series that they are going to run with the *Ticonderoga* to be sure that they have good, quality missiles. Nobody expects them not to have some margin for error. But I think that in the low altitude area there just was not enough testing to satisfy me.

Even in the morning's Washington Times, there is a comment by Admiral Watkins. Let me find it. It says that Mr. Lehman defended the accuracy of the *Aegis* missile system. He said that it has achieved a 70 percent kill success against 160 targets in 8 years of testing. He again adds in the developmental testing with the operational testing, and I think that is fine if you want to look at it overall. But I do not think it gives us a fair comparison of what the ships will do under actual conditions.

Now I will give them a margin for error. You are going to get a few targets through, there is no doubt about that. But I just don't think that you can continue to have credibility with this Member of Congress when you say one thing in the press and openly discuss that and then hide behind a secret designation on the information situation or as close as we can put it to that.

Senator COHEN. Of course, it does make a difference. If you look at these box scores, they can be misleading can they not?

You could have 100 percent success on some moderate to light types of attack. On the other hand, you could put them through a very stringent, demanding type of environment and come up with, say, 40 percent. It would look very bad. That might not necessarily simulate what the actual situation would be in a time of combat.

Second—and I don't know the answer; I will ask the witnesses that follow you about this—it seems to me that, if we are going to talk about near-combat circumstances, we also ought to take into account the existence of other systems there. There was no air cover, as I understand it. This ship was sitting naked out there in the water. There was no CAP—Combat Air Patrol—as such.

There were no other systems ringing the ship, as you would have in an actual combat scenario.

So it was just sitting out there, alone, completing these tests.

That is somewhat different than what you would have in an actual combat environment. Would you agree with that?

Representative SMITH. There is no doubt about that.

I think if you are going to try to pose that to the follow-on witnesses—and I don't want to get into an inter-service rivalry, but I certainly think having to face some of the jamming of some of the other services and particularly what the Russians might face in a fleet environment, also taking into account that they are going to have to worry about, if nothing else, bumping into a submarine in the night, we do have to worry about having protection from the submarine threat that is also against this vehicle at the same time they are trying to defend against a missile attack, and/or just a low-level, kamikaze-piloted vehicle.

So, I would just continue to want the Navy to test this vehicle more, and before we buy an awful lot more of these ships. We do have 13 of them authorized at this point. We know that we have problems in the spending area of the defense budget. Are we, in our role, as the civilian monitors of this entire system for the defense of this country, monitoring closely enough this program?

I would just ask that the members of the committee be given page A-29 out of the Navy operational evaluation report to study and have it explained which targets had stand-off jam, which had chaff, at what altitudes the targets were acquired, at what altitudes the missiles were filed, and why they were missed.

It is not a total success, as the Navy might advertise publicly, but it is not a total failure either. But, somewhere in between, probably, the truth lies.

That is not the case for the April and May testing. I think the April and May testing should be properly guided to be sure that the holes that were in this test series in April 1983 and September 1983 are filled. If they are not filled, we should correct them.

Senator COHEN. Senator Hart mentioned the fact that a page was missing. Is that the pages you are referring to now?

Representative SMITH. This was the page that was missing from a document that I was brought. I knew that there were people who had been leaking classified information.

I'd like to keep my credibility not only with the other Members of Congress, but with the Navy and the Department of Defense. At no time have I released to anyone who was not qualified to have it, the information.

Page A-29 was missing from the document. Maybe it was a Xerox machine. It's a document that is about a half-inch thick. I didn't want the document. I just wanted to look and see what the test results were. This was enough. I think that there are reasons for the misses, such as human, as in the commander's decision to shoot at the one that said don't shoot. There were other reasons, where they did not get a fuse to arm. Well, those things will happen and we need to be aware of that.

But, on the other hand, I don't think that the crossing of the low-altitude targets have been looked at well enough. I think we can well afford to waste a few million dollars—and I say that very carefully—with a program that is going to cost a billion and a quarter; it is too expensive not to test and test to levels so that we know we are buying the best piece of equipment.

AEGIS SUPERIOR TO OTHER RADAR COMBAT SYSTEMS

Senator COHEN. Would you agree with the Navy's statement that the Aegis system is superior to any other radar combat system known today for either tracking or detecting targets in the air?

Representative SMITH. I am not sure that I am qualified to make that kind of statement.

I do think this. It probably is better than what they have today. I guess my question would be is this the best we can do. We must realize that we are going to modify systems so long as we have them and have them in active use. But, are we procuring too many in advanced procurement without really fully testing to where we can make the changes? For example, there is the change from aluminum to steel armament. Some of these things I think really need to be looked at. I think they need to be looked at this year, Senator.

Senator COHEN. As I understand it, you want 200 more tests, is that it?

Representative SMITH. Well, I think 200 tests for a program of this kind—you know, we never have seen a multiple attack where they had to fire at 18 targets or track and fire at the same time without the simulation. They can't do that. I doubt if they will ever be able to simulate that or even come close to it.

We ought to max the system for what the test capability is. I think you are aware of what that is. I don't know whether it is classified or not.

Senator COHEN. If we are talking about building a ship for 30 years in the future, I think it is anticipated that any ship that we build is going to undergo modification in its technical components to improve it. It's true of the aircraft that you were flying. Any airplane when it is first brought out certainly does not come out without bugs and deficiencies which are improved as time goes on, keeping the same structure, basically, but taking advantage of improvements that are made in technology.

I assume the same thing will be true here. We are not building a ship today for the year 2020 without contemplating changes for that ship.

You would agree with that, wouldn't you?

Representative SMITH. Oh, I would agree with that.

I guess my concern is not so much for the ship, because I don't know anything about ships. You know, part of the time I call them "boats," and that worries the guys in the blue suits.

Basically, the radar system is where I have my greatest problem, and whether this has really been tested fully to where we know it is going to work. In the OPEVAL, it was not always working and it was not always human error.

I think that is of grave concern for us, when this is supposed to be the shield of the fleet. To continually, even in this morning's paper, say that this thing has had a 70-percent accuracy, is not doing a service to the Navy nor to the procurement nor to the Congress.

I would disagree with the Secretary of the Navy on that. I think it does need more testing.

There is one other question that I recall.

I talked to Admiral Linder about the independent testing and to Admiral Carter. They have a good reputation. I am not questioning their integrity. I just think that we, as the civilians who are involved in this process, need to be sure that if we want to be sure that it is tested, we will be sure to lay on a certain number of low altitude targets, a certain number of crossing targets. Let's specify what we want to test the system.

There are experts who can guide us in this. I don't have any problem with that.

Senator COHEN. I tend to agree with you about the need to build the best that we can possibly build in any system, so that our service men and women do have the best equipment.

One of the paradoxes involved by some of those asking questions, indeed, including my colleague and friend, Senator Hart, is there is a famous phrase that is often quoted: Better is the enemy of good enough. On the one hand, we have a lot of criticism directed toward the military for trying to build the best of everything, which is getting so expensive. When the Navy comes with something that is a lot better than what we have, that is good enough though not quite at the outer edge of the envelope, as you might say, they then come under an equal amount of criticism because they haven't built something better, haven't built the best.

So, it is one of those situations where, perhaps, the trust lies somewhere in between. If the best is the enemy of the good, or the better, we ought to take that into account, too, realizing that we are going to go through an evolutionary process of getting better as we build more and more.

I certainly am prepared to ask the admirals who are going to follow you these questions. You certainly are welcome to stay to listen to their answers. We will continue to investigate the issues you have raised to see whether or not they have measured up to their own standards or measured up to a standard that would be acceptable to a majority of the Members of this Congress.

Representative SMITH. Admiral Walters points out in his procurement briefing which preceded me, that we are buying the 14th, 15th, and 16th, and the first of the DDG-51 class. The DDG-51 is not due to be operational until 1989.

We are not cutting the procurement back to just be sure that this testing is done. The test is scheduled for later this month. By the time it is analyzed, I presume we would have a report by July 1. I don't think we would set the program back nor have the best or the good, as your analogy is.

Senator COHEN. Oh, it is not mine. I just hear it quoted all the time.

Representative SMITH. I really do not want to be the enemy of this ship. I want to be for more testing. I think we have been a little lax in maybe not providing the kind of testing that needs to be done for this kind of vehicle with this kind of money involved, Senator.

Senator COHEN. Well, as I have indicated before, I think you have done all of us a service in continuing to ask questions about the system. I hope people have some answers.

Representative SMITH. Thank you, Senator.

I appreciate the opportunity to present this testimony at this time.

Senator COHEN. Thank you, Congressman Smith.

Representative SMITH. I would commend to you page A-29, Senator.

Senator COHEN. Senator Stennis, do you have any questions you would like to ask?

Senator STENNIS. No, Mr. Chairman, I don't have any questions.

I know this gentleman knows a great deal more about this grey area than I do. I am not in this ballpark. I want to have his testimony evaluated, though, by someone who can make a study of it.

You have made a rather good impression here. You have a good face, if I may say it, and you have responsibilities that I have had as a Member of the Congress.

This is a very grey area. I heard an Admiral say that he thought the *Ticonderoga* was the finest fighting ship in the world and the best that had ever been put together, or words to that effect. It impressed me greatly.

Now, I think we have made a lot of mistakes here in the years that I have been here. We had a lot of ships that may have been voted for that were not proven conclusively as having been perfected.

But you make a good witness, sir, and I am going to look at this further.

Representative SMITH. Senator, I appreciate that. I would just commend to you page A-29, again, because I think it is the key page in understanding what has happened. I think that is history.

Senator STENNIS. Is that the missing page?

Representative SMITH. Yes, sir, but it is not missing any longer. I think the important point is not what has happened but what is going to happen in the series of tests that they have agreed to hold in April and May. I think we need to look forward to solving the problems with the weapons system.

If I have one effect, I just hope we get more testing out of this.

Senator STENNIS. Well, if someone asked me, Mr. Chairman, if I wanted to read the Congressman's testimony, I would have said no, I want to see him, I want to hear him, I want to hear him testify.

What do you say to the chairman's point here that you are not going to get a perfect product, that we can't wait until we have gotten the ultimate before we start building? That is the way I understood his comment.

How would you answer that?

Representative SMITH. Well, Senator, I think the fact that we have 13 of these ships, three of which I understand are in the water at this point in some phase—the *Ticonderoga* has been in the Mediterranean—and I think we have another 10 that are authorized by the Congress that are moving down the production line at some point, so the 1985 budget contains the 14th, 15th, and 16th of the CG-47 class, so I don't think we are exactly stopping the program. That was not my intent, and it still is not.

I just want to be sure that the modifications that should be made, things that are vital to the people who are going to operate it, that they are tested and changed now, before we get into a very costly retrofit.

Senator STENNIS. I have just one more question.

Did you advocate switching over from aluminum to the iron or steel?

Representative SMITH. It is one of the things that I have in there questioning, whether the aluminum armor is something we should continue to have.

Senator STENNIS. Did you make a judgment on that yourself?

Representative SMITH. No. I have talked to a lot of people and read about the problems associated with it, and, apparently, the Navy, from Admiral Walter's testimony, I gather, has come to that same conclusion.

Senator STENNIS. That is all I have.

Thank you, sir.

Thank you, Mr. Chairman.

Representative **Smith**. Thank you, Mr. Chairman.

I really appreciate this opportunity.

Senator **Cohen**. Dr. Friedman, would you please come to the witness table.

STATEMENT OF DR. NORMAN FRIEDMAN, DEPUTY DIRECTOR, NATIONAL SECURITY STUDIES, HUDSON INSTITUTE

Dr. **Friedman**. Thank you very much for the opportunity to address your committee.

Have you read my testimony? I ask you because it is long.

Senator **Cohen**. Yes, it is long. But you are so adept at summarizing that I thought you might do that for us today and touch upon the highlights of your statement.

Dr. **Friedman**. Well, hearing what has been said before, I think the most important question is if you accept the lower levels that people say the system has had, how good is it, how does it answer what it has to do, how important is it?

Now, the first point, I think——

Senator **Cohen**. Excuse me, Dr. Friedman.

DEVELOPMENTAL/OPERATIONAL TESTING

For purposes of preliminary explanation, would you discuss the differences between developmental testing and operational testing? What is the significance? What happens when you combine the two? Is that a misleading indicator of the ship's capability? That should give us a preface to a good discussion.

Dr. **Friedman**. Yes, sir.

First, if you are looking at developmental, I think Congressman Smith had the distinction correctly. While a system is being developed, great varieties of technicians and experts operate the system. When it is operationally tested, it is left in the hands of people who are less expert. You are using Navy crewmen.

Now, the question is what you are testing it for.

As developmental tests, you are looking for things you want to fix. You are looking, in some cases, at whether you want to buy the system in the first place. In other cases, you are looking for fixes that you had better do or else.

Afterward, you are expecting that most of the problems have been solved, and you are looking for relatively small things that have to be fixed.

Now, when you are looking at a computer-oriented system like this one, after a point, most of the changes will be in the programming, in the instructions, in the computer that runs the ship.

Now, that is not so expensive to change because it involves changing some of the instructions. The initial program is a very expensive proposition and at a cost comparable to the actual pieces of the ship. But if you think of getting the bugs out of, say, a home computer system, where IBM, for example, when it first sold the PC, it had a habit, I think, when you subtracted zero in some cases, it did not know what you were doing and it did something crazy. IBM sold it for a while and then they realized that they had better do something or else. That was a relatively simple production line modification.

Now, the crime is if your operational tests reveal some horrible mistake, like the ship goes backward or the missiles don't take off when you push the button, which is extremely expensive to change, you somehow hide that, and then, when the thing is in service and you are hoping that it will perform reasonably well, suddenly it performs badly, miserably. From time to time, there have been disasters in every service of that type.

The question usually is how urgent it is to get it into service. How much can you accept? It is a judgment thing on how much you are trading off having something out there versus having some capability you would like.

Now, in the case of this system, for example, the advertised capability of the *Aegis* system is to deal with x targets simultaneously, and the number that is quoted in public is always 18. The actual number is secret, so I will say that I am quoting a public number.

Now, the claim has been made that it usually can handle something more like six at this stage, and that sounds pretty awful.

If you look back at other ships, previous types, you are looking at ships that are supposed to handle up to 3, where the number 3 is the same as the number 18.

So, in practice, you are talking about ships that can deal with one or two simultaneously.

Now, on that basis, six is pretty good. In fact, on that basis, you are pretty glad that you have anything better than what you had before.

Now, the question then is this: Is it a matter of some relatively simple upgrade to the ship or is a new missile coming? These ships are designed to be able to accept newer and larger missiles later on. If you look at the missile launching system of the MK-26 and the vertical launchers, they are all designed with a lot of growth in them.

I don't think there is any question but that there is growth in that system for later on.

The only point I want to make is that the claimed results, when one says that the results are not good, it turns out that the not good is really pretty good by the standards of what we have.

If you look at what we are up against, that is sort of what you need. The problem is what we are up against is large numbers of Soviet aircraft turning up, dropping their missiles, and, as you, yourself, pointed out, this is a layered environment. You hope that the fighters, for example, deal with some of those bombers before they get into range.

The Soviets will do their best to present as many missiles to us as they can simultaneously. That has been their policy since they invented that kind of missile. We do our best to make it very difficult for them.

For example, they are not interested in wasting missiles on an *Aegis* ship. They are interested in getting the carrier, or getting the ship that is going.

Well, you jam a lot. They have to fly in a lot closer to decide what they are shooting at. Your fighters then have a good time with them while they are coming in closer.

To that extent, jamming and ECM are two-sided.

The main thing about these ships is that, in the early 1960's and late 1950's, we built a lot of missile ships. There was a crash program. The crash program had serious problems at that time. It was called the Three T Program.

Senator Stennis, you will remember it. You would have been authorizing money for them in the late 1950's, and you probably remember also the problems that they had, the "Get Well" Program, and the rest of the story.

I must say, if we had not built the ships then—and in Vietnam they were very useful for air control, where they did shoot down targets with missiles quite successfully—they would not have been there at that time.

Had we not had the sense that we had to have something urgently in the late 1950's, there would not have been anything at all out there when we needed it. I say this even though you can find reports in secret files dated around 1960 or 1961 that we have now spent I forget how many billions of dollars on junk. The "junk" word I remember from the report. I was fascinated by it.

Senator COHEN. That page was not missing? [General laughter.]

Dr. FRIEDMAN. Not where I was looking, it wasn't. [General laughter.]

TYFON

It was a very nasty report from inside McNamara's program evaluation office. The consequence of it actually was that they wanted a new missile system then, called Tyfon. Tyfon was a very expensive system. Tyfon was, in many ways, the predecessor of *Aegis.* The word went down from on high that you will fix what you have, or else, and you will not get your new system unless you do that.

They did not get their new system.

Well, I think that the new system would have shown up about 1970, had it not been for the cost of fighting the war in Vietnam. I think, if you read the internal naval documents about their needs for new anti-aircraft, you will find that it was a very urgent need, even 5 to 10 years ago.

The systems we have now are basically the fixed Three T systems. They are good. They are as good as anyone else's. But they are not as good as what we need to deal with the kinds of attacks that are now coming.

The low level is a problem. Now, there is no one else who has solved it any better, and I think we are doing as well as one can.

A lot of the problem is not in the ship's system, but you have to fix fuzing in the missile. It comes down right at the water, and missiles sometimes have a tendency to think the water is the target. This is unfortunate for them.

Senator COHEN. Was the *Aegis* cruiser using chaff?

Dr. FRIDEMAN. They don't use the chaff until the missile approaches them. The chaff is for self-defense.

The fear is that a Russian bomber does jamming as it comes in. They come in in formation. The game is that they come in together, they drop together, so all the missiles arrive together.

Our end of the game is you jam them so that they cannot tell which ship is which. You can use decoys. You could make the *Aegis* cruisers look more like carriers. It is a confusion game.

The closer they fly, the more time the fighters, who are way out beyond the missiles, have to deal with them. The fewer missiles then come in and afflict the ships.

You are talking about raid by a regiment that I think is 20 to 30 aircraft. Each airplane may have one or two missiles. Some of the airplanes will be jamming to try to make it hard for us to see them. They will do things like lay corridors of chaff so that you can't see them from the side.

We will make attempts to pick them up further out by their own emissions. You make them turn on their radars and you hear the radar and go out and attack them.

Senator COHEN. What about the argument that by turning on our radar, it is a nice, big beacon out there for the aircraft to attack?

Dr. FRIEDMAN. Well, the claim is made that, because the *Aegis* radar moves the beam around very rapidly, and because the beam can be moved randomly, it is more difficult to get a direction find and fix on it than on a conventional radar.

My comment would be, basically, if you are smart, you use something else to know you are going to be hit, and then you turn it on because they've got you anyway. And we try to do that.

The Russian airplanes take off. They turn on their radars. We can hear. You use radar early warning aircraft, like the Grumman E2. If it is not in a carrier group, you can hope that other assets may be available.

You try to be clever.

It is obvious that any radar that is very unique someone will catch on to. One reason that some of the *Aegis* ships have another radar on them, conventional radar, is exactly because when that is turned on, you can't tell they are *Aegis* ships. You pick up that something is coming, so, OK now go, boys.

So, that is a question of can you turn it on or off rapidly. I am told by the Navy that this is unusual, being able to be turned on and off extremely fast. Most radars have to warm up. If you turn them on rapidly, something breaks. With this one, they think otherwise. That is an impressive self-defense.

I add that once the missiles get through those *Aegis* missiles, there are other things trying to stop them, lots of others things. The numbers are just not that great that you have to achieve 100 percent or you are dead.

So, I think that is a fair summary of what I have said. I am open for your questions, Mr. Chairman.

[The prepared statement of Mr. Friedman follows:]

PREPARED STATEMENT OF NORMAN FRIEDMAN, HUDSON INSTITUTE

(NOTE.—The opinions herein expressed are the author's own. They are not the views of the Hudson Institute or of any of its clients, including the U.S. Navy.)

DDG 51, the *Arleigh Burke*, is to be prototype of a new class of missile destroyers. The comments which follow are addressed to two distinct questions. First, why is this new class of U.S. surface combatants necessary? In other words, are surface warships worth building, given their vulnerabilities? Second, is it necessary that such ships be equipped with the Aegis weapon system? Underlying both questions is a more fundamental one: in what context will U.S. naval forces have to operate over the projected lifetime of these ships? Destroyers are currently credited with a lifetime of about thirty to forty years. Thus, if construction of the DDG 51 class were to continue over the next two decades, ships of this type would still be in service in the year 2044.

The United States needs surface ships because it needs and uses the surface of the sea in many ways. It must be able to continue to use the sea, essentially for transportation, in the face of air, surface, and underwater opposition, both potential and actual. Fundamentally, the surface of the sea is valuable because only ships moving on it can easily transport very large amounts of material over great distances. That is a consequence of the laws of physics, and is therefore unlikely to change in the foreseeable future, despite considerable advances in the only alternative means of overseas transport, the airplane. That means, for example, that an aircraft carrier is the mobile equivalent of an airport, of that it was considerably easier for the United States to transport war materiel by sea over about 10,000 miles to South Vietnam than it was for the North Vietnamese to move infinitely smaller amounts a few hundred miles down the Ho Chih Minh Trail, even when they did not face air attacks en route.

Similarly, because motion over the sea is extremely cheap in terms of energy expended, ships have a unique capability to remain on station near areas of interest to the United States without requiring nearby bases. That is the "presence mission," in peacetime perhaps the most important role of every Navy. Ships so serving are displaying the ability of the United States to project its interests abroad. Warships are the least intrusive—but one of the most important—means of displaying this potential. In the past, many navies, including that of the United States, built ships specifically for Third World presence missions. That practice had to be abandoned as the cost of first-line naval forces increased and, incidentally, as the level of threat a Third World state could mount increased. Thus warship designs are no longer justified in tems of the presence mission. However, it is an extremely important one, and must be kept in mind.

That is, visits by aircraft or by troops (as in joint exercises) generally require considerable cooperation by the visited party. They are also perceived as quite intrusive, partly because their presence is so temporary. Any subtle threat they present is a fast-evaporating asset: the subtle message is that they must either be used almost at once, or they must soon vanish. Either they are an immediate threat, or an empty one. In either case, they are not nearly so effective as the well-armed ship casually visiting a port, displaying capability with a minimum of obvious threat. Surface ships are necessary for such missions; submarines are valuable in direct proportion to their invisibility, and it is impossible to be impressed by an invisible visitor. Note that the presence missions demand that a surface warship carrying it out be capable of surviving whatever attacks the local power may be able to mount. Otherwise it will have no credibility at all.

Presence can extend quite far, towards the naval protection of U.S. interests. That is, for example, the mission of the destroyers now patrolling the Straits of Hormuz, through which much of Europe's oil flows. Submarines cannot perform this mission because its essence is to be seen, hopefully as a deterrent. A ship on such duty must be able to protect itself. Otherwise, it is an empty threat, even an object of contempt. Recent unhappy experience throughout the Third World shows how important it is for U.S. forces there to be seen to be effective at all times.

As for transportation across the sea, there is no liklihood that surface ships will be superseded. Certainly submarines are inherently much less vulnerable, but the nature of their design limits their internal volume. For a given investment, they just cannot carry nearly as much material as a surface ship. For example, in the mid-1950's the then-Bureau of Ships studied submarine equivalents of existing landing ships and even aircraft carriers. In each case, the conclusion was that the result was extremely expensive, and that it was a poor substitute for the surface ship—and that it would have been a very unsuccessful submarine.

If much of the Navy, then, must exist to protect surface ships, then surface ships themselves will continue to be necessary for that role. That is, although submarines may be able to protect surface craft from other submarines, they are ill-adapted to dealing with the other major threat, air attack. Moreover, because submaines cannot easily work in close proximity with each other, surface ships play a vital role in anti-submarine screening, albeit often in cooperation with submarines.

That means that surface ships remain necessary now, and into the future. That they are sinkable is unquestioned; it is also irrelevant, since they are necessary if the U.S. Navy is to protect the interests of the United States. The issue, rather, is to chose the best compromise between combat effectiveness and the cost and size of individual units. The complexity of the projected DDG 51 is a measure of how far the threat to surface ships has grown in recent years.

It should perhaps be emphasized that this is not only the threat presented by the Soviets. Clearly one hopes that there will never be a major war, naval or otherwise, with the Soviet Union. However, and examination of the history of the past four decades shows that warfare in the Third World, both against Soviet-oriented states and among nonaligned states, has been frequent. Indeed, as Soviet and U.S. influence in the Third World wanes, the control currently exercised by the two superpowers is likely to wane as well. Moreover, given vital U.S. interests in many parts of the world, it would be difficult to guarantee that the United States would not in some way become involved. The Falklands War was a case in point: two U.S. allies came into collision, and U.S. efforts to solve their mutual problem were entirely futile.

As Third World states become more prosperous, and as their armaments become more sophisticated, the present mission, formerly relatively easy to conduct, becomes more difficult; the minimum level of capability rises dramatically. In particular, it seems likely that over the next few years—certainly over the life of this class—several Third World states will gain the capability to develop and produce their own advanced anti-ship weapons. This development would be of fundamental importance to the U.S. Navy because, being nonaligned, these nations would be entirely uncontrolled in their arms exports. Hence the level of threat to Western naval vessels anywhere in the Third World is lakely to rise dramatically, just as the number of vital naval missions in that part of the world also increases. It is not that such weapons will be terribly effective compared to the best Soviet or U.S. equipment, but rather that they will be much better than what a nonaligned country can buy on the open market right now.

In wartime surface combatant ships operate in two distinct ways: with and without the assistance of carrier aircraft. Because carriers are and will almost certainly remain scarce, surface formations without air cover will be relatively common. They will include convoys carrying vital war materiel abroad; Surface Action Groups built around the recommissioned battleships. Surface warships would also protect the underway replenishment ships without which carrier battle groups could not continue to function. They would also protect amphibious assault groups. In each case, surface warships would be the only available protection against air attack. They would also provide all or most of the protection against submarines.

Surface combatants such as the DDG 51 would also form an essential part of the carrier battle group, providing part of the multi-layered defense against air attack, and also an important part of the battle group protection against submarine attack. In this role they would receive the greatest support, since carrier aircraft would always be on hand, but they would also face the stiffest opposition. Note that, although one or more submarines would generally operate in direct support of the battle group, close-in screening would still have to be done by surface warships. The reason is that otherwise there would be too great a chance of a fatal error, due to the inherent difficulty of communication between aircraft, surface ships, and submarines. That is, the protection of the battle group is very much a joint function of aircraft, surface ships, and submarines, all of which are essential.

Numbers are important in each role. So is high capability—which is inevitably expensive—in each ship. Historically, the U.S. Navy has achieved a compromise by building several different classes of surface combatant ships, ranging from relatively austere (frigate) to highly capable (cruiser). The destroyer is a compromise, designed for production in considerable numbers, but lacking some of the capability of the cruiser. The DDG 51 is intended, then, to replace existing destroyers, which will be approaching the end of their operational lives in the next decades.

The numbers issue deserves some mention here. From about 1918 through the late 1970's, the United States was perhaps the world's largest operator of destroyers. That was a historical accident, but a very favorable one. The first big batch was built during World War One as part of the program to combat the German submarines. These "flush-deckers" served through the interwar perioid, when shipbuilding funds were relatively scarce. New destroyer construction began about 1933, but the vast numbers the United States Navy enjoyed in the 'fifties were all the result of the massive industrial mobilization for World War Two. Those ships in turn were worn out by two decades of hard Cold War service, culminating in Vietnam.

The current attempt to rebuild the destroyer force is only the most recent of several, all of them based on the need for large numbers. For example, it was initially hoped that about one hundred *Spruance* class destroyers would be built, but there was no money, due to the war in Vietnam, and in the end there were only thirty—supplemented by one additional ship and by four ex-Iranian missile destroyers. The

Spruance in turn replaced an earlier new-destroyer program called Seahawk. Now the problem is, if anything, more acute because of the few ships actually built during the late 'fifties and early 'sixties are nearing the end of their useful lives. They can be rebuilt, but they are inherently very limited—among other things, because they are considerably smaller than the proposed ships, about half their size in some cases.

DDG 51 differs from its predecessor destroyers in several ways, but most notably in its anti-air capability, achieved by its Aegis combat system. The combat system, with its associated phased-array radar, in turn represents a large fraction of the cost—and the complexity—of the new ship. It certainly differentiates DDG 51 from the nearest destroyer equivalent, the *Kidd* class (DDG 993).

The experience of the Falkland War showed that modern surface warships could be damaged and sunk by air attack. Moreover, it was painfully obvious that, as in Vietnam, modern guided missiles were not 100 percent effective—neither on the attack or on the defense. Neither conclusion should have been particularly surprising. For example, almost any Navy veteran of World War Two can affirm that air attacks can be deadly, despite very heavy defensive fire. However, war carries risks. Control of the sea is so important that the United States has always been willing to risk loss of life to secure and maintain it. The issue is not whether any ship claim invulnerability. It has always been how well surface ships can defend themselves against air attack, and that has always been resolved primarily in terms of weapons and their supporting combat systems.

The phrase "combat system" is relatively recent. Ships are still described in the popular reference books in terms of the weapons they carry, not the combat systems which control those weapons. The combat systems in effect determine the extent to which the full potential of the weapons aboard a ship can be realized. For example, both the *Kidd* and the *Ticonderoga* are built on the same hull, and each carries a pair of twin Mark 26 missile launchers firing the same Standard Missile. Yet the *Kidd* can engage only three targets at a time, due to limitations inherent in her combat system. Depending upon conditions, the *Ticonderoga* can engage simultaneously up to about six times as many. Note that one *Ticonderoga* does not cost anything like six times as much as one *Kidd*. The difference is actually greater under some circumstances, since the Aegis ship can fire the same missile to about twice the range, giving her time to engage even more targets. DDG 51 will fall somewhere between the two, since her Aegis system will be more austere than the *Ticonderoga*'s.

In fact the new Aegis cruisers and destroyers probably cost much less than twice as much as their predecessors, which is why the Navy can hope to replace existing ships on something approaching a one-for-one basis, achieving much more capability without losing the numbers it needs for flexibility and worldwide deployment. One might add that, the greater the numbers, the less the effect of combat damage or loss. However, if ships do not have some—very considerable—minimum capability, they will be lost without accomplishing very much. The combat experience of the Royal Navy, both in World War II and in the Falklands, is a sobering reminder of the high cost of building overly austere ships.

Note that the costs of current and previous warships are difficult to compare because of the very rapid inflation in weapon system and shipbuilding costs over the last decade. For example, the austere *Perry* class frigate was deliberately limited so that its cost could be held down to about $45 million in fiscal year 1973 dollars. At that time it was estimated that an austere Aegis destroyer, DG/Aegis, much less capable than DDG 51, would cost about $125 million. A fiscal year 1985 frigate now costs almost $500 million, a figure which includes considerable improvements over the original austere design. Even so, the ten-fold inflation (which is admittedly quite approximate) is sobering. It suggests that DDG 51 is actually well within cost. These are approximate figures, but they are illustrative of a wider phenomenon, the explosive inflation of the cost of many weapon systems. The reasons for the problem cannot be addressed here, nor is the author aware of any good explanation for them.

Aegis is the most complex modern naval combat system. Clearly increased complexity brings with it potential problems; the question is always whether that complexity is warranted. In the case of Aegis, it appears that there is no real alternative, either proposed or projected. The air threat to surface naval forces, as it is posed both by the Soviets and by many Third World powers, is just too massive to be countered by any less capable system.

Why is that? An air attack on a surface ship can be characterized in two ways: by the number of attackers appearing within some short time, and by the warning time. Massive numbers apply one kind of stress; very short warning time applies another. The first might be typified by a Soviet-style missile-bomber attack, in which a regiment consisting of about twenty or thirty bombers flies in formation, the aircraft dropping their missiles together, as far from their target as possible. The missiles all approach together at high speed, and the ship must destroy all of them within a very brief time.

The short-warning threat might be a sea-skimming anti-ship missile, like the French Exocet, which does not appear at all until it comes over the horizon perhaps ten or fifteen miles from a ship. The missile is flying about ten miles a minute, which gives the ship very little time to react. Somewhere between the two is the Soviet Oscar-class submarine, which can fire a salvo of up to twenty anti-ship missiles from underwater, thus effectively duplicating the performance of the bomber regiment.

Aegis was originally conceived largely as a means of dealing with massive air attacks, i.e., with the numbers problem. However, it incorporates later ideas which were adopted specifically to deal with the short-time threat, largely in the area of automated reaction. The essence of the system is the SPY-1 radar. Because it is electronically scanned, the radar can track a very large number of radar targets simultaneously. A conventional rotating radar will see a target only once every rotation. Since a typical rotation rate is 15 revolutions per minute, a conventional air search radar may "see" each target every four seconds. An airplane flying at 600 knots (ten miles per minute) moves two-thirds of a mile between observations. No matter how narrow its beam, the radar is limited in its ability to keep track of each target. An electronically-scanned set, however, can return to each target as often as it likes. It can observe fast targets very frequently, to make sure that it is tracking them accurately; slow targets can be sampled less frequently.

Tracking in turn is the essence of fire control. That is, in order to hit a target the combat system must predict its future position, just as a hunter must lead a bird at which he fires. That prediction in turn depends upon knowledge of the past motion—the track—of the target. The more accurate the track, the better the fire control. In pre-Aegis systems, search (rotating) radars could obtain only relatively inaccurate track data, which they used to point fire control radars. The latter did the actual fire control tracking, one radar to a target. That is why it is easy to calculate the number of targets a pre-Aegis ship can engage simultaneously: it is the number of fire control radars. Each radar, then, is one element of a fire control channel, a capability to deal with one target. A ship with four fire control radars, then, might be called a four-channel ship, capable of firing at four targets simultaneously.

The SPY-1 is better, because it can track much more precisely. Tracking is so precise, in fact, that defensive missiles can be commanded to fly into the vicinity of their targets. They require additional radar assistance (in the form of a slaved illuminator) only at the very end of their flights, when they actually intercept their targets. Because the limited number of illuminators can be shared out among defending missiles already in flight, an Aegis system can control many more missiles than it has illuminators. That is why the number of targets it can handle cannot be determined directly, at least from external appearances.

The Soviets are well aware of the limitations of conventional air defense systems. Typical Soviet surface combatants suffer from the limitation of one missile fire control director per target. Soviet tacticians understand the issue, and for some years they have practised the mass bomber attack already described. They are unlikely to abandon it in the near future: the numbers problem, technically known as saturation, can only become worse.

The only solution is to provide more channels per battle group. In principle that might be done by providing either many more conventional ships or a few more Aegis ships. For the sake of argument, one might say that an Aegis destroyer has twelve channels, a conventional ship, three. Each Aegis channel would actually be more effective than each non-Aegis channel, but even when the two are equated the difference in effective firepower is staggering: each Aegis ship is more than equivalent to four non-Aegis types, at least from the point of view of anti-aircraft capability.

There is, to be sure, a cost: the Aegis radar is quite distinctive. It is sometimes described as a dangerous beacon. That is true: once the radar has been turned on, the fact that the ship carries Aegis is probably impossible to conceal. However, the radar might well be turned on only after a raid had already been detected by other means, such as an airborne early warning airplane. In that case it would be obvious that the battle group had already been detected, and further concealment would be pointless. The beacon issue, then, is tactical, not technical. Any weapon is effective only when it is used properly, and the fact that Aegis can be mis-used, that (like anything else) it has inherent weaknesses as well as strengths, is unsurprising and, ultimately, of little moment.

The Falklands War provided an example of this numbers issue, when the British destroyer *Coventry* was sunk by three Argentine attack bombers, striking simultaneously. She was a two-channel ship. On a grander scale, one might imagine a regimental raid resulting in the firing of thirty missiles at a battle group. The destroyers would not have to deal with all of them, since individual ships in the group would have countermeasures and close-in defenses. However, even so, the disparity between three Aegis ships and three non-Aegis ships is striking: thirty-six channels vs. nine channels. The Aegis ships, in themselves, would have a fair chance of defeating the entire raid. The pre-Aegis ships would have almost no impact on the raid, unless they could fire at so great a range as to engage more than one target per channel (in sequence). However, Aegis is even better adapted to such tactics, so that it would presumably enjoy an even greater advantage.

Note that a short-wave pencil-beam radar such as SPY-1 is probably ideal for detecting and tracking low-flying targets such as sea-skimming airplanes and missiles. The wavelength chosen for Aegis, S-band, is actually a compromise between long range (which favors longer wavelength) and low-altitude or precision performance (both of which favor even shorter wavelengths).

Much has been made, in recent weeks, of testing failures. The reader should be reminded that no current or projected missile system is expected to achieve anything remotely like 100 percent capability. Even at one-third capability (six out of eighteen targets per ship) an Aegis ship is more capable than an existing two- to four-channel cruiser or destroyer, even if the latter has 100 percent capability. Moreover, the purchase and operating cost per channel, or per target shot down, is substantially lower. Four Aegis ships, each destroying six targets, can defeat a twenty-missile raid. Four conventional (four-channel) ships, each shooting down half the incoming targets they engage, have nothing like as great an effect. Note that most ships in service have fewer than four fire-control channels.

There is no question but that it would be preferable for the Aegis ships to meet their full designed performance. What is striking is tht, even given the performance which has been criticized publicly, they are superior to their predecessors, at much the same cost, when cost is adjusted for inflation. Many have asked why the United States is not enjoying defense economies based on automation. Aegis is just such an economy. It does not look like one because the threat has escalated just as the defense has improved.

At the other end of the range of threats, a ship must be able to respond extremely rapidly to a missile suddenly appearing. Aegis is typical of current U.S. Navy combat systems, in that the system is designed to begin to fire at any incoming target it detects. The human operator can veto firing, but he cannot be expected to react quickly enough to order the system to fire. Modern naval warfare is filled with potential surprises attcks; these combat systems are designed to avoid them. Hence the current intense interest in avoiding operator delay in firing. Note that, with an operator initiating the engagement, it might be as much as three minutes between target detection and the firing of a defensive missile. If the incoming weapon first appears only about ninety seconds before it hits, that is about four minutes too long.

Such automation is extremely important when U.S. warships patrol turbulent areas, such as the Persian Gulf. In such cases several local groups may seek the propaganda advantage of a successful surprise attack on a U.S. ship, and the opportunities for surprise are numerous. It is difficult, moreover, for a ship to remain continuously on alert—which is where automation helps.

Senator COHEN. Thank you.

What was the name of the ship, the Swedish boat that went under as it came out of the harbor?

Dr. FRIEDMAN. Oh, the *Vasa*.

Senator COHEN. That came to mind as I listened to you about what would be necessary if you had such major deficiencies and things did not work quite right. That ship apparently did not undergo any developmental or operational testing before it tried to get out from the bay into the open seas. It is now a monument in Stockholm, as I recall.

Dr. FRIEDMAN. There are a lot of cases like that in history. That is merely the most notorious.

Senator **Cohen**. I cannot recall who designed that ship.

Dr. **Friedman**. I think he would prefer that you didn't recall. [General laughter.]

AEGIS DEFICIENCIES

Senator **Cohen**. In any event, Congressman Smith raised the issue about not going forward with the *Aegis* until such time as these deficiencies are corrected and more testing is done. He did raise the issue, not the specter but the issue, of whether or not major amounts of money would be necessary to indulge in substantial retrofitting.

Based upon your statements, you have indicated that it is not a question of major retrofitting, as much, but rather of changing computer software.

Is it your evaluation that one should look at whether or not the deficiency is of a major or minor nature?

Dr. **Friedman**. Well, my guess would be software, because the basic principles of the system have been set. If you want to change the system now in some fundamental way, it won't be merely a change that you will accomplish for $100 million. It will be disaster time.

Guessing, from what I know of the system, that it is fundamentally sound, that suggests the software, because the system is so closely linked to computers. If it is software, then the odds are that the changes will be possibly difficult to find what you have to do. But, a software change can be spread through a whole fleet of ships very rapidly.

It is like buying a computer program. It may take them a lot of money to figure out what instruction to change, but the new program can be manufactured very cheaply.

That is one of the few good things about going over to all computer.

So, my guess would be, as you go more toward computer oriented systems like this one, you will have less problems with major mechanical changes, major hardware changes, and actually you gain quite a bit in being able to change with flexibility.

Senator **Cohen**. Would it be a fair statement to say if you go from aluminum to steel in the *Aegis* cruiser, you are talking about scrapping this ship for all practical purposes and starting over again? Can that be done?

Could you take this design and make a steel superstructure?

Dr. **Friedman**. You would have to change the hull. You would have to make it a bigger ship. The aluminum is what is very high on the ship. There is a lot of surface area of aluminum.

I would point out that most of our ships have that feature.

To change it, you would need a lot more stability, and that means a bigger hull.

So yes; you would have to make a new ship out of it.

ALUMINUM SHIPS PROBLEMS

Senator **Cohen**. Have you examined the changes Admiral Walters talked about, some of the changes they have made in the current aluminum superstructure?

Dr. **Friedman**. Yes, sir.

Senator **Cohen**. What kind of improvements are these based upon your examination?

Dr. **Friedman**. Well, the basic problem with aluminum has always been fire. If you burn an aluminum ship, it melts. In fact, I think the Falklands was not a very good example. The best example is a ship called the *Belknap,* which had a collision with a carrier in 1975, I believe. A fire started in the boiler room and, essentially, the ship melted to the main deck.

At that time, there was tremendous pressure for retrofitting aluminum superstructure ships so that the fires could be controlled and so the aluminum would not melt. The impression that I get is we have solved that problem.

I think, if we had to start over, we would have been happier with larger ships. But the choice was made in the CG–47 to go with an existing hull to save some money. It saved a great deal.

My guess would be, from the point of view of fire, they probably have done very well.

The other question is whether it will resist attack, by such as machinegun fragments, bomb fragments, things like that. That is a problem. There are things that you can put inside aluminum which will help.

Steel is just a much simpler proposition. But I don't think aluminum is so much of a death trap as one might imagine, especially if you make the efforts. It costs.

But it is a problem where, once you have gone down a certain path, is it cheaper to just scrap the program and start over, or would you rather try to fix it as it stands.

That is a problem throughout most Western navies.

Senator **Cohen**. Have you looked at the test results and examined them, and compared the developmental tests with the operational ones?

Dr. **Friedman**. I have not examined the results in detail, but, of course, I have seen the public reports.

What I am saying is only that, from the way the tests have been reported, being somewhat skeptical of the claims of 100-percent reliability, and the rest, it sounded as though what we had was significantly better than what we had in the past.

I think it is only fair to say yes, I would like it better, and I would like it closer to the advertised capability, but when you look at the worst of the results, they still look fairly good to me—on that basis.

Senator **Cohen**. Thank you very much, Dr. Friedman.

Senator Stennis, do you have any questions?

Senator **Stennis**. Thank you, Mr. Chairman. I have no questions of this witness. I do want to thank him for his testimony, though. We appreciate it.

Senator **Cohen**. Admiral Walters, would you please come forward again, and perhaps Captain Donegan can come up to the witness table as well.

[Pause.]

Admiral Walters, you may proceed as you wish, either deferring to Captain Donegan or beginning yourself.

But first, I think I would like to begin by asking you some brief questions.

TICONDEROGA/OPERATIONAL REQUIREMENTS

First, to what degree did the *Ticonderoga* meet or exceed its operational requirements during the OPEVAL tests that were conducted in April and September 1983?

How do you compare the proclaimed success for the *Ticonderoga* with the hit/miss box score results?

That might be a good beginning and we can proceed from there.

I see that Congressman Smith has remained in the audience. I would hope, as we proceed today, that any additional questions he might have, he would feel free to submit for the record.

Admiral WALTERS. Well, I think, first of all, how did we do in accomplishing the test objectives, let me say this.

We really met all of the test objectives that OPTEVFOR had established for the ship; that is, the kinds of things that he was looking for that it should perform and do. That excludes the box score because those are broad issues that you are trying to make objectives.

It met all of those objectives, except two. One is that we did not——

Senator COHEN. Tell me what the objectives were. State those first, and then we will talk about what was achieved and what was not.

Admiral WALTERS. I think Captain Donegan has those listed.

OPEVAL OBJECTIVES

Captain DONEGAN. The fundamental objective of the OPEVAL is to test the operational suitability, the operational effectiveness of the overall ship.

Those objectives are established in the test evaluation master plan, OPTEVFOR, for test against them.

And, as the admiral said, there were 12 laid-out operational suitability objectives, and 14 operational effectiveness were laid out.

The operational suitability generally deals with how the ship performs in warfare areas. Operational effectiveness generally deals with how the ship performs in matters of reliability, logistics, training, and documentation.

As the admiral said, the ship met all of the operational suitability objectives that were established, except for the shock test, which was deliberately put off to the second ship. It met all of the operational effectiveness objectives which were established.

Senator COHEN. But you have not told me what those objectives were.

Admiral WALTERS. We are going to have to provide those for the record, Senator, I don't think I have those in my possession.

Now, they are easy to come by. I just don't happen to have them with me today. There are 26 of them.

Senator COHEN. Can you give me some general idea of what you were looking for? We put a new ship out there and we say we want, as a primary mission, to have it defend against an air attack against our carriers.

Admiral **Walters**. You want to determine, for example, is it effective against and can it track the number of aircraft that we have said it can in an air surveillance mode; can it fire its missiles effectively in an antiair warfare mission; can it fire its ASW weapons effectively against a submarine threat; can it perform naval gunfire support; can it perform the command and control functions expected of the cruiser and designed into it.

Other questions you want to answer are these: Can it provide surface surveillance, for example? Can it maintain an availability of some given number of its weapon system over a given period of time? Will the reliability of the equipment be such that we can resupply the spare parts to keep it operational over a period of 60 days in a seagoing environment?

Those are examples. Can it be maintained by sailors?

That is a fair run of the objectives. I wish I had brought them with me.

Senator **Cohen**. I just wanted to have some perspective on what we were looking for in terms of operational evaluation. You can provide the rest of those for the record.

Admiral **Walters**. Yes, sir.

[The information follows:]

CG-47

The operational effectiveness and suitability requirements from the CG 47's Test and Evaluation Master Plan, TEMP No. 100 are displayed below in two columns. First the parameter with a concise definition, and secondly COMOPTEVFOR's evaluation taken from the OPEVAL Report.

CG 47
OPERATIONAL EFFECTIVENESS AND SUITABILITY REQUIREMENTS

PARAMETER	OPEVAL EVALUATION
1. Simultaneous Warfare Area	1. Capability effectively demonstrated.
2. Probability of successful AAW engagement • ASM (single ship, low altitude, missiles, multiple shot) • ASM (single ship using ESM, low altitude, missiles, multiple shot) • ASM (single ship, high altitude/driving, CAP and/or missiles, multiple shot) • Maneuvering manned aircraft in adverse environment (single ship, SM-2, multiple shot) • Maneuvering manned aircraft in adverse environment (multiple ship, SM-2 multiple shot) • Maneuvering manned aircraft in adverse environment (single ship, CAP, SM-2, multiple shot)	2. Very effective capability demonstrated.
3. Probability of successful SUW engagement • Within radar horizon range • Outside radar horizon range	3. Capability effectively demonstrated.
4. Probability of successful ASW engagement • Using LAMPS and ASW aircraft • Ownship, two ASROC/torpedoes	4. Excellent capability demonstrated.

5. ~~(U)~~ Force Coordination	5. Capability effectively demonstrated.
Coordinate and control the operations of the task organization or functional force to carry out assigned missions, including: • Providing command and control facilities for a task organization commander and staff • Coordinating the reconnaisance of multiple surface, subsurface, and/or air contacts • Functioning as AAW control ship; as Screen Commander; as SAU Commander • Operating as Contact Area Commander to coordinate multi-type search and attack operations • Coordinating AAW target assignments for up to 6 mission units (including ownship) and 12 CAP, including up to 10 controlled by ownship	
Provide communications for coordination and control of the task organization or functional forces: • Coordinate tactical voice communications	Effectively demonstrated.

• Maintain visual communications; uncovered RATT/CW communications; multichannel cryptographically covered teletype transmit and receive circuits	
• Process message traffic	
• Coordinate underwater communications	
• Maintain automatic relay communications; full duplex encrypted teletype transmit and receive circuits; voice/teletype cryptographically covered satellite communication circuits	
6. ~~(U)~~ Survivability/Vulnerability Near Miss Nuclear Blast System EMP hardness ECCM Environment	6. YORKTOWN (CG 48) will be shock tested this summer Active survivability aspects were satisfactory A number of passive survivability aspects were satisfactory, some deficiences were noted
7. ~~(U)~~ Provide electric, water, air and climatic support to the combat system	7. No problems noted

OPERATIONAL SUITABILITY	OPEVAL EVALUATION
1. ~~(U)~~ Availability Overall probability of being available and reliable (PAR) for 60-day mission	1. Operational at-sea time insufficient to demonstrate PAR for 60-day mission.
2. ~~(U)~~ Engagement sustainability	2. Satisfactory.
3. ~~(U)~~ Logistic support	3. No data, test period too short.
4. ~~(U)~~ Compatibility	4. No major compatibility problems noted.
5. ~~(U)~~ Interoperability	5. No major interoperability problems noted
6. ~~(U)~~ Training	6. Much improved. Validates need for shipboard training.
7. ~~(U)~~ Safety	7. No major discrepancies.

OPERATIONAL CHARACTERISTICS FOR AEGIS WEAPON SYSTEM

OPERATIONAL EFFECTIVENESS

1. ~~(U)~~ Number of simultaneous engagement; including non-firing. (One terminal engagement per illuminator)	1. Six was the maximum possible because of a computer simulation design limitations. However, an assessment of the WCS scheduling queue, illuminator busy time, and homing time indicated that deleted simultaneous engagements would have been attainable. The only way to test beyond 6 is with live targets. There is no range capable of flying enough targets to flex the AEGIS system deleted deleted.
2. ~~(U)~~ System reaction time with SM-2 (average) ● Clear environment ● Adverse environment	2. Clear: Adverse: deleted:
3. ~~(U)~~ Probability of successful engagements, P_{SE1} (including detection to intercept, single shot with SM-2 nominally clear environment)	3. N/A

OPERATIONAL EFFECTIVENESS (Continued)	OPEVAL EVALUATION
4. ~~(C)~~ Probability of successful non-firing engagement P_{SE2} (including detection to simulated intercept, single shot with SM-2, actual targets, simulated missile, nominally clear environment)	4. D
5. ~~(U)~~ Probability to successful engagement P_Z (firing decision to intercept, single shot with SM-2, nominally clear environment)	5. N/A
6. ~~(U)~~ Survivability/vulnerability	6. Satisfactory
OPERATIONAL SUITABILITY	
1. ~~(C)~~ Operational availability (A_O)	1. [deleted ⓒ]
2. ~~(C)~~ MTB(C/M)E - Mean Time Between (critical/major) events • Level 1 • Level 1A • Level 1B	2. [deleted ⓒ]
3. ~~(C)~~ MTB(C/M) - Mean Time Between (critical/major) interrupts configuration 1, 1A and 1B	3. [Deleted ⓒ]
4. ~~(U)~~ MTTR - geometric Mean Time to Restore interrupts configuration 1, 1A and 1B	4. [Deleted-ⓒ]

deleted

OPERATIONAL EFFECTIVENESS (Continued)	OPEVAL EVALUATION
5. ~~(U)~~ Scheduled maintenance time per 24 hour period	5. 2.1 hours
6. ~~(U)~~ Restoration time (maximum) • From scheduled maintenance • From system test	6. From scheduled maintenance. [Deleted] From system test - performed on line exceeds criterion.
7. ~~(U)~~ Logistic support	7. Satisfactory, documentation needs improvement.

WASTE HEAT BOILER CHARACTERISTICS

PARAMETER	OPEVAL EVALUATION
1. Reliability	
• R (mission reliability/mission duration) (boiler system)	Excellent performance based on 10,933 operating hours.
MTBF (WHB)	
• R (mission reliability/mission duration) (WHB)	No critical/major casualties - 17,611 hours with no major failures
2. Maintainability	
Corrective maintenance	2.68 hours
MTTR	4 hours
MaxTTR (90%)	
Preventive maintenance	3 actions/38 days
Frequency (per day)	14 minutes
Mpt (minimum)	120 minutes
Mmaxpt (minimum) (90%)	
3. Logistic supportability required spares on board	No data
4. Operational availability Waste heat recovery	
$\frac{\text{UPTIME}}{\text{UPTIME + DOWNTIME}}$	1.0 Produced steam of excellent quality. Significant improvement over DD 963 class WHB.

SHOCK TESTING

Senator **Cohen**. Tell me about the areas that were determined to be deficient, or where you postponed testing something. You mentioned the shock testing.

Admiral **Walters**. We specifically had an objective—and I will take personal responsibility for this. It is the kind of decision that I get paid to make—that we would try to deploy this ship early. We have witnessed over the years that it has taken 2 years to deploy the new ships that we have built. I felt that it was important for a ship with this kind of capability to get into an operational environment as soon as possible.

So, we had the objective to deploy it in 9 months from the time it was delivered. We did that.

I think the experience of having that ship in the Sixth Fleet during the Beirut crisis has been invaluable to us.

It was also an invaluable asset to the Navy.

So, in doing that, we had to say that some of the tests we were going to do were going to be done on other ships, specifically the shock tests. The shock tests will be done, I believe, in August of this year, on the U.S.S. *Yorktown,* which is the second ship of its class.

The other thing that we did not accomplish is this. We always spend about 2 weeks on the operational evaluation period. So, obviously, you could not collect enough data during that 2-week period to say that you had an availability over a 90-day period for the equipment, nor could you support the 60-day spare parts usage business.

Now that data is being gathered under controlled conditions by OPTEVFOR during the deployment. And when they get that all back, they will come up and tell us what those numbers are, and we will see whether or not it meets our threshold.

We have done that kind of thing, for example, on almost every ship that we have tested, simply because the operational test period does not cover that long a period.

Captain Donegan, did you want to add anything to that?

Captain **Donegan**. Not at this time.

Senator **Cohen**. Why don't you begin your presentation, then.

Admiral **Walters**. Well, I was going to cover the high points of this, and let Captain Donegan, who is an expert from the project office, give you a short presentation.

Senator **Cohen**. What I want you to do, basically, is to direct your comments. You can start off in general terms, but try to respond to Congressman Smith's criticism about the discrepancy between what the Navy says it will do or has done, and what it in fact has done—why there has been such a downplaying of the so-called misses; what were involved in those misses; how many problems were human and how many were technical; how many were misjudgments—this is what I think we have to get at. Also, why were there not more low-flying missiles tested? Can they be tested within the near future? How many targets could we possibly deploy? Do we have 200 targets to deploy against any ship? How long would it take to get that many targets, and what would be the impact upon our fleet?

I think those are the kinds of questions we want to address in this hearing, keeping it open as much as we possibly can so that the press will have every opportunity to listen to the Navy's explanation.

Admiral **Walters**. I think that the short presentation that I have, which is unclassified, together with what Captain Donegan has, will address all of those questions, except the mythical 200 targets. I don't have a good definition for that.

Senator **Cohen**. Has the Navy ever maintained that it has the capability for tracking 200 targets?

Admiral **Walters**. Well, tracking 200, yes. The system has the capability to track more than 200 targets. I am not sure whether that is what the Congressman is concerned about, saturating the system or trying to just simply say that we ought to fire at 200 targets. I would have to defer my question as to what he meant on that to him.

That is the only thing I am not prepared to explain, the 200 targets.

Senator **Cohen**. Well, the Congressman is still here.

Why don't you speak for yourself, sir.

MULTIPLE TARGET TESTING

Representative **Smith**. Admiral, how many times have they ever run multiple targets at the same time? I'm not talking beyond your test capability of, you know, half a dozen at a time, where you would have a realistic second.

Dr. Friedman mentioned that they would come in in a group upon launching their missiles. That's true, you know, on two or four ships at the same time. Then the multiple targets would result from those.

I think that is the kind of thing that needs to be tested, I guess, if I were to help direct what happens in April and May—it won't affect 200 targets.

Admiral **Walters**. We conduct those kinds of tests normally using manned aircraft. I think I understand now what is meant.

He is talking about track capacity. I think that about 55 simultaneous aircraft in the air is all we ever actually have mustered against the *Ticonderoga*. Against the cornfield site, so to speak, up in New Jersey, during the earlier test phases, I believe there was one occasion in which they had well over 100 aircraft.

But it is difficult for us to muster the number of aircraft out in an area much more than 50 or 60 at a time. It is just simply hard to get them there.

That is a shortcoming that we have not demonstrated.

As the Congressman alluded to, we have ways of stimulating the system with simulation and we have done that. So we are confident that we can handle the track load.

As a matter of fact, the *Ticonderoga* in the Mediterranean has handled track loads of hundreds of aircraft. I suspect they probably have some data to prove that, if we could extract it from their data files.

Senator Cohen. You can defer to the captain, but first you will have to permit me to go to the floor to vote. I will return shortly and we can go through your interrupted presentation.

This meeting will stand in recess for about 10 minutes.

[A brief recess was taken.]

Senator Cohen. Captain, why don't you begin with your presentation.

STATEMENT OF VICE ADM. ROBERT L. WALTERS, USN, DEPUTY CHIEF OF NAVAL OPERATIONS (SURFACE WARFARE), ACCOMPANIED BY CAPT. JOHN J. DONEGAN, JR., USN, AEGIS SHIPBUILDING PROJECT COMBAT SYSTEM ENGINEER, NAVAL SEA SYSTEMS COMMAND

Admiral Walters. If I may, sir, I will cover the first part of this.

Current Issues

More testing; big investment in "unproven" capability; targets not threat representative.

The first issue, of course, that has been raised is that we need more testing, that we have had big investment and an unproven capability, and that the targets are not threat representative.

That is what I want to address, those issues.

We have scheduled an additional phase of follow-on operational testing based upon the recommendations of Admiral Carter, COMOPTEVFOR. The purpose of the testing, as is always in the case of follow-on test and evaluation, is to verify that corrective action has been taken when we have found any deficiencies during an operational evaluation.

This is a big investment in these ships. In this spirit, the Nation has made a large investment in the *Aegis* cruiser. But their capability is not unproven. In fact, they are the only ships capable of handling the antiship cruise missile threat of today and tomorrow.

They are needed in the fleet in numbers, and, as you properly pointed out, we need to be building ships and, hopefully, we will correct problems as we go along.

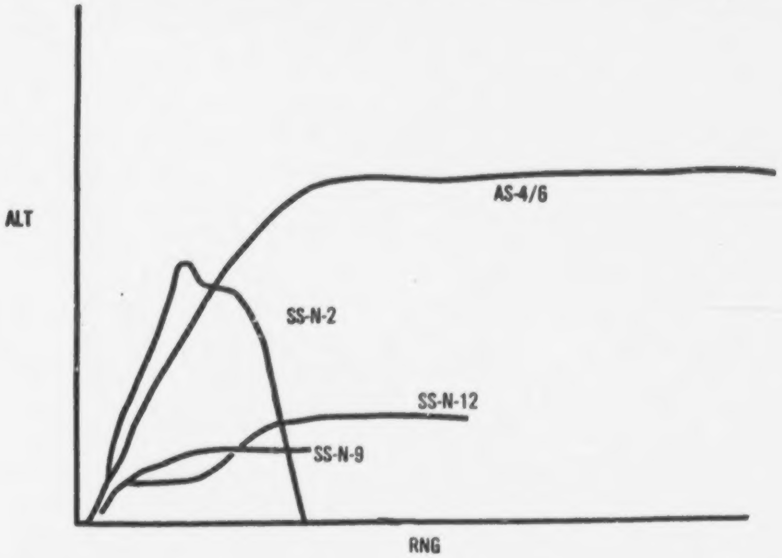
Ticonderoga herself already has fired 55 missiles.

Norton Sound has fired 66, prior to the *Ticonderoga.*

In fact, *Norton Sound* fired 28 missiles under test conditions before the *Ticonderoga* was even appropriated.

It has been charged that the targets are not threat representative. Today's targets accurately replicate about 99 percent of the threat. Where there are shortfalls in the Navy's target inventory, there are developmental programs which will deliver the required performance at the earliest possible time.

1976 SOVIET ASCM THREAT



To give you an example, and by way of background: In 1976, when the Secretary of Defense formally approved the *Aegis* shipbuilding program, the Soviet threat would be represented as you see on the slide.

The threat consisted, essentially, of three kinds of missiles: Those that came in at very high altitude, some at mid-altitude, and a few at low altitude, which were in the neighborhood of something less than 1,000 feet.

Senator Cohen. Admiral, what year was that?

Admiral Walters. In 1976, when the system was designed and approved by the Secretary of Defense.

Senator Cohen. Now, the SS-N-12 is what? Is the nine the low-altitude threat?

Admiral Walters. The SS-N-12 and the SS-N-9 both came in low on their final approach, but they were not low altitude in the sense that we use today.

Those are existing missiles in the Soviet fleet.

Senator Cohen. What, then, is their altitude?

Admiral Walters. That information is classified. That is why I have tried to declassify this chart. I can answer that for you in closed session, or I can answer it for the record.

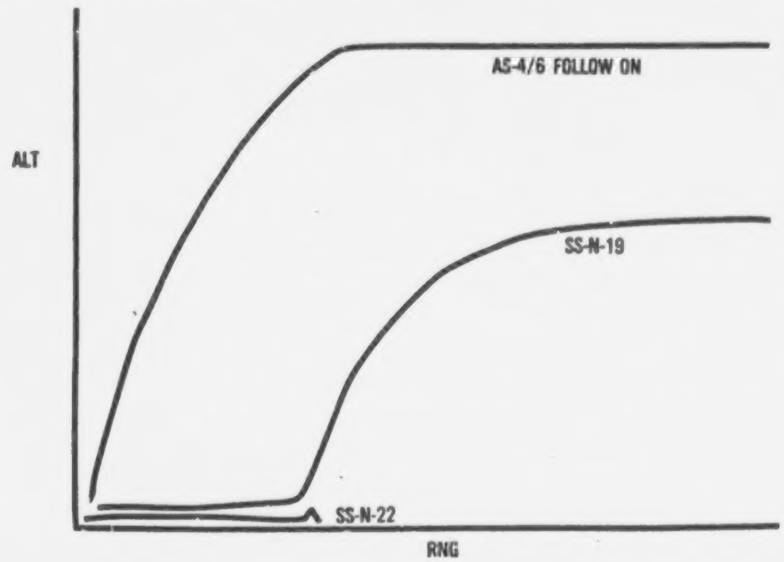
Senator Cohen. Well, then, let me ask you this: Is the *Aegis* capable of handling those threats?

Admiral Walters. Absolutely. Yes, sir.

Senator Cohen. So that is within the 99 percent range?

Admiral Walters. Yes, sir.

1984 SOVIET ASCM THREAT



As the threat has progressed, it can be characterized in this next slide as being higher and faster, and lower and faster.

It is important to note, for example, that the low, fast, but shorter range SS-N-22, which is shown at the very bottom there [indicating] represents less than 1 percent of the Soviet threat today.

That is going to grow, obviously, in the future, so we are concerned about the low-altitude threat.

Senator COHEN. Is that because they have fewer of these missiles in their inventories today?

Admiral WALTERS. This missile just became operational in the past year, and I think currently is installed in the *Sovremeny* class destroyer, and there is only one of those in commission.

Senator COHEN. Would it be a reasonable statement that the Soviet aircraft probably would have to try to fire many different types of missiles, at high altitude as well as with low altitude?

Admiral WALTERS. The interesting part of this threat, Mr. Chairman, is that this is a ship-launched missile. The maximum range of this ship would bring it well within the attack envelope of our ships using Tomahawk or aircraft on the carriers.

This is a threat that somehow or other would have to get inside our defensive umbrella anyway before it even could launch the missile. That is highly unlikely.

Senator COHEN. Could it be launched from a submarine?

Admiral WALTERS. Right now, we are not aware of a submarine capability for this particular model.

Senator COHEN. But that is reasonable to anticipate, is it not?

Admiral WALTERS. It is reasonable to anticipate that they will have something similar.

Senator COHEN. But my question is this, and perhaps Dr. Friedman is the one to answer this.

Does the Soviet strategy today combine high altitude with low altitude? Is it a combination threat that they try to achieve? Or are they likely to move toward a multiplicity of SS–N–22 types of attacks?

Admiral WALTERS. I think we can look at it in two ways.

Senator COHEN. In other words, as you are building for the future? What threat are you building against? You can take care of 99 percent of the current threat. In the next 10 years is the threat likely to change more toward that for which we do not yet have a total capability?

Admiral WALTERS. The Soviets have a large and sophisticated Navy. My professional opinion is that they will continue to have weapons in all regimes because they characteristically favor a mass of anything that they do.

I would not expect them to concentrate any of their attack capability at any particular region. I think that they will maintain a broad spectrum as much as we do.

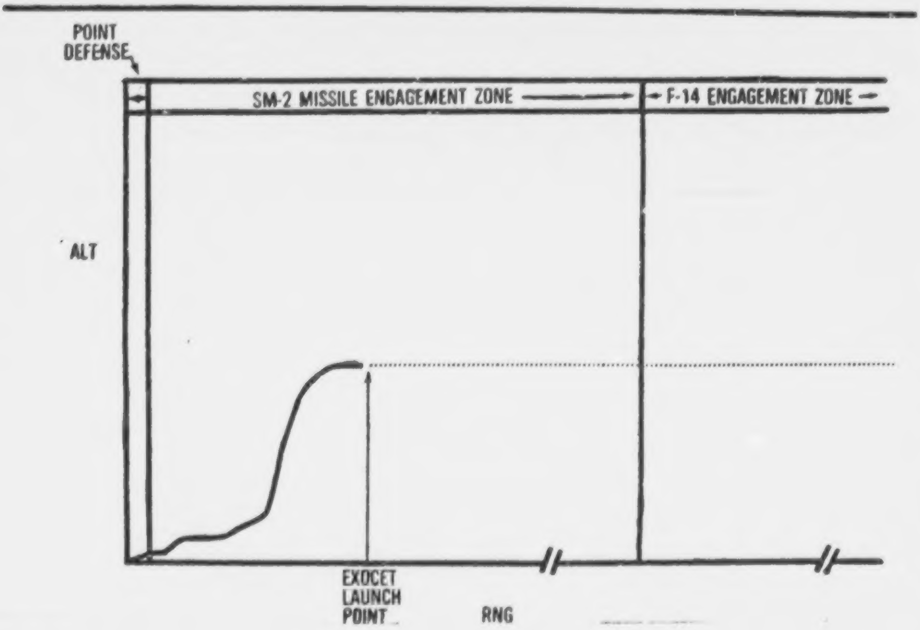
Of course, there is the potential that you can have a rapid succession of what we call "stream attacks." That is the kind of attack that you could have which would be launched by submarines. It would fire six or eight missiles at a time at you.

That is one case where you can have several missiles coming in one regime. But I think, overall, my opinion is that they will maintain the capability of high targets, medium targets, and low targets, from a multitude of platforms.

THIRD WORLD THREAT

Now, the Third World threat, another one that we have to worry about, is somewhat different than a Soviet threat. It most frequently is examplified by Exocet.

EXOCET ENGAGEMENT PROFILE



As can be seen on this slide, the Exocet carrying aircraft has to come well within the F-14 engagement range and the *Aegis* ship standard missile range before it can even launch its missile. In the case of the way we employ our forces, any aircraft that is coming in to launch that missile is going to be under attack well before he comes within the maximum range of Exocet.

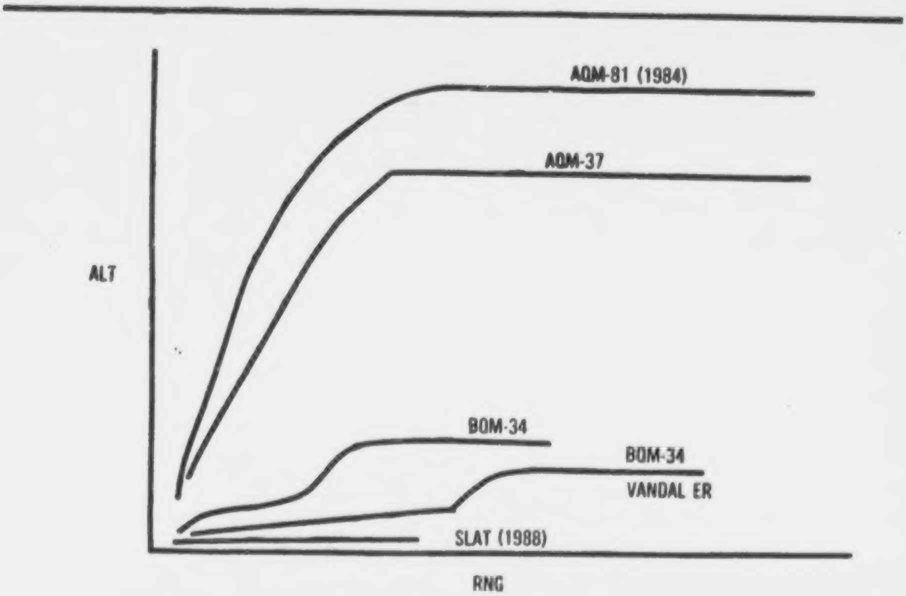
Even after Exocet is launched, it comes down in three steps. An *Aegis* system, and, in fact, almost all of our surface-to-air missile systems today, should be able to enagage that missile before it gets into its terminal phase, which is the very, very low altitude regime that everybody is worried about.

So, we have ample opportunity to engage that missile before it gets into that range.

Also, in the case mentioned by Dr. Friedman, all of our ships have multiple layers of defensive capability. The *Aegis* ship with its missile system, or any of our others, also have close-in weapon systems, they have electronic warfare, they have decoys. All of these things are employed in real world situations, but not employed, for example, in the testing and evaluation of the *Ticonderoga,* because there we want to test just that part of the system that is new.

The charge has been made that we do not use adequate targets.

NAVY TARGETS



In the next slide, we show the targets that we have today. We have targets that cover, essentially, all of the performance of enemy missiles. [Deleted.]

This inventory accurately replicates 99 percent of the Soviet threat today. It provides, in conjunction with electronic countermeasures, which were employed against the *Ticonderoga,* an extremely demanding test of the capabilities of *Aegis* ships or any other missile ships that we have in today's fleet.

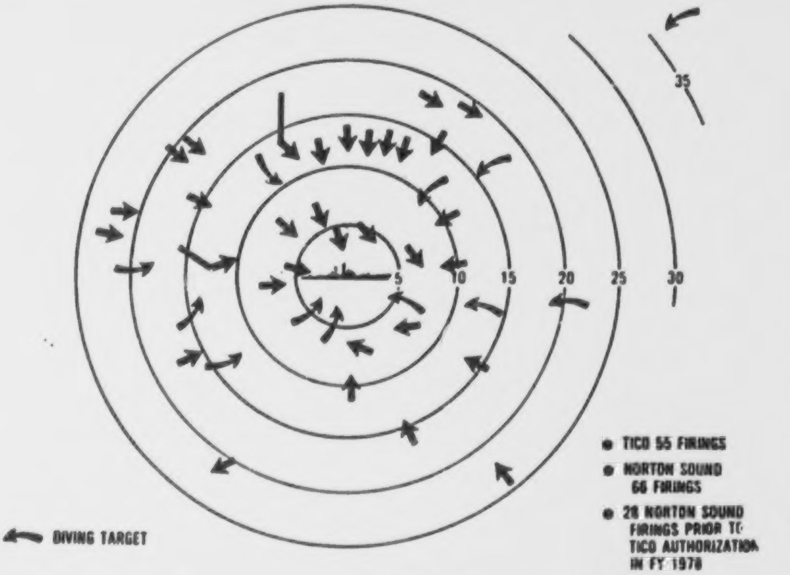
With the advent of the supersonic low-altitude target, called SLAT, which we will not have until 1988, we feel we will have the total weapon inventory that we understand today covered with target representation. The SLAT, of course, is the very low one there [indicating]. It will be supersonic and very low altitude.

Senator COHEN. Is that something that the Soviets have at this time?

Admiral WALTERS. That represents a threat, as I said, that the Soviets have in one ship that has just been introduced in the past year, the SS-N-22.

It is a supersonic, very low-altitude missile, but surface launched.

TICO FIRINGS AUG 82—OCT 83


35
5
10
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● TICO 55 FIRINGS
● NORTON SOUND 66 FIRINGS
● 28 NORTON SOUND FIRINGS PRIOR TO TICO AUTHORIZATION IN FY 1978
DIVING TARGET

I have mentioned stressing tests, and this slide shows that we have, indeed, covered the spectrum of tests in terms of range, diving targets, crossing targets, low-altitude targets presented to the *Ticonderoga*. In unclassified form, this essentially shows the types of targets that have been presented. The ones with the crooked arrows are ones that were diving.

This is a typical characteristic of a cruise missile. They will come in at one altitude, and then they dive in their terminal phase.

Senator COHEN. Will you just go back and clarify one thing for me, Admiral Walters?

When you say that by 1988 we will have the SLAT, does that mean we will then have a target capable of flying that particular mission against the *Aegis*?

Admiral WALTERS. Yes, sir.

Senator COHEN. But it does not mean that the *Aegis* necessarily will have the capability of taking it out, does it? Am I wrong on that?

Admiral WALTERS. Well, we hope that it will. Of course, that is the purpose of some of our testing now, to determine the effectiveness of the system against very low altitude targets.

Today we are using the Vandal target, which is a mach 2.5 target, that flies in the neighborhood of about 50 feet. The problem with Vandal is that it is a very expensive presentation, and so far we only have it set up to be launched from our test ranges.

REALISM IN OPEVAL

Twenty targets presented for *Ticonderoga* engagement: 17 in ECM and chaff environment; 9 flown at supersonic speeds; [Deleted]; 4 flown at altitude of 100 ft. or less; [Deleted]; 3 multiple target presentations; 2 raids of 3; 1 raid of 2.

What we would like to have is SLAT, which would give us the capability to do it in an open sea environment.

A demonstration of the realism that has been shown in the operational evaluation is shown here [indicating], where we had 20 targets presented to the *Ticonderoga* during the operational evaluation period.

Seventeen of those 20 targets were delivered in an electronic countermeasures environment with also the employment of chaff. We did, in fact, use U.S. Air Force jammers as part of the jamming capability that was used against this ship.

Nine of the targets were supersonic. Six of these were flying at mach 3 or above. Four of the presentations were in an altitude of 100 feet or less. Of those, two were at less than 50 feet.

So, we may not have satisifed Congressman Smith's desire that we do more low altitude, but certainly we did a share; about 20 percent of these shots were at low altitude.

Finally, we did have multiple target presentations.

There were two raids of three targets and one raid of two targets. I believe that our maximum ability to put simultaneous targets against the ships with the current facilities that we have on a test range is somewhere in the neighborhood of four or five. We will probably be lucky to get four simultaneous presentations—simply because it is a very difficult task in controlling drone vehicles at high speeds at different altitudes, and so forth, simultaneously on a range and still maintain safety with both the firing ship and other aircraft and ships that might be in the area.

AEGIS TEST ACCOMPLISHMENTS

Has been tested for 12 years; *Ticonderoga* has fired 55 missiles; OPEVAL most stringent conditions ever presented; best targets we possess were used; tested all speed and altitude regimes; subjected to multiple target attacks; faced heavy electronic jamming; met or exceeded all 24 objectives tested (shock test, 60-day availability, 90 day sparing); OPEVAL designed to stress ship and find problems.

I think, overall, that we have a good record of *Aegis* test accomplishments.

We have tested this system for 12 years. As I said earlier, we have fired 55 missiles in a very short period of time. The *Ticonderoga* had not been in commission yet for 1 year, and she already had fired 55 missiles.

The OPEVAL, by Admiral Carter's own admission and as stated in his operational evaluation report, was conducted under the most stringent conditions ever presented to a ship.

The best targets we possess, or that any service possesses in the United States, were used.

We tested all speed and altitude regimes. We did subject the ship to multiple target attacks. We did use heavy electronic jamming, again, using Air Force assets where we did not have enough.

We met or exceeded all of those 24 objectives for which I still owe you the list, and you will have them for the record.

CONCLUSIONS

No ship or system subjected to tougher test; overall tests results very gratifying; any other ship would have been over-whelmed; *Aegis* only system with required capability.

Finally, I think it is important to understand that operational evaluation is designed to stress the ship and the system. It is designed to stress the people and the system.

We found that people did make mistakes. We found some things that we needed to stress better in training. We found that there were system errors, and in every case so far it was software errors.

I think it has cost us something like $450,000 to fix all of the software errors that we found during those operational evaluation tests.

Captain Donegan is prepared to go into some more detail on that, and certainly we will answer all of your questions.

I think that this, on an unclassified basis, can give you the impression that we have done the best we know how to test this ship. I don't think we have consciously withheld any information except for security reasons.

Senator **Cohen**. Was that A-29 page withheld for security reasons?

Admiral **Walters**. No, sir.

It turns out that when the document in question was presented to Congressman Smith, it was the interim OPTEVFOR report, because that is all that we had. He had knowledge of the final report, which we did not have.

Now that report came from my office, and we did not possess the page or the publication in the final report form that he was asking for. As soon as we got the final report, we took it to him.

I can only say at that point in time that his intelligence was better than mine, because he knew the page number in a publication that I did not hold.

There was no intent to withhold that page from him.

Mr. Chairman, if I could, I will now ask Captain Donegan to proceed.

NAVY PUBLIC RELATIONS CAMPAIGN

Senator **Cohen**. What about his statement that the Navy has tried to overstate the successes and minimize the failures with a public relations campaign?

How would you respond to that?

Admiral **Walters**. Well, I don't think that we have had a public relations campaign, specifically.

I have had concerns, for example, about the discussion of some of these things from the standpoint of national security.

I specifically chose not to reply to the Wall Street Journal article that he referred to because I did not feel it was in the interest of the U.S. Navy to do that, and the CNO and the Secretary of the Navy agreed with me.

Senator **Cohen**. Was that article based on classified information?

Admiral **Walters**. Yes, sir, it was. That has been the problem.

We have tried to make our statements accurate. Everything that the Secretary of the Navy and the CNO have said has been factually correct, and they have been in the interest of security. That has been the biggest problem in dealing with this.

That is why we have tried to give this to you today in an unclassified form, without the numbers and so forth. Where you want more detail, we simply will have to go into closed session.

Senator COHEN. Are you prepared to respond to the Journal article allegations on a statement by statement basis, as to whether it is correct or incorrect?

Admiral WALTERS. Oh, yes, sir. We have done that. We have that somewhere in my backup material in the office. That was done by my staff the same day the article came out.

Senator COHEN. Thank you, Admiral.

Captain Donegan?

Captain DONEGAN. Mr. Chairman, I think in the interest of time, a lot of the issues I was going to discuss were covered.

What I would like to do is start with a movie. I will discuss a couple of things as you see the movie. But first there are three slides that I would like to show you before we get to the movie.

MULTIPLE TARGET ENGAGEMENT

The reason I am doing this is I definitely would like to get the issue of a multiple target engagement in front of the open session here this morning.

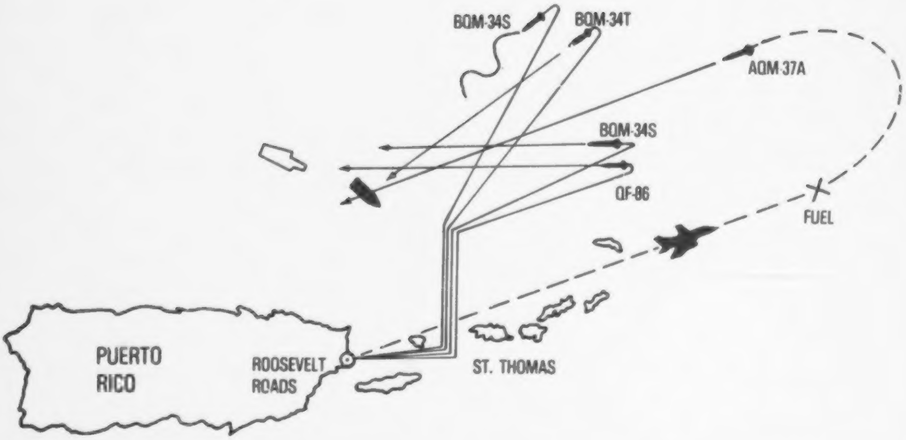
The engagement we are going to look at was conducted in one of the development test phases. The development tests have been described in various terms this morning and have left the mental impression that somehow they are not as stringent as the operational tests.

In fact, I feel they represent a spectrum of tests that cover a broad range of capabilities, leading up to operational tests.

We have the same environment in development tests. We use the same jamming. We use the same chaff. We are subjected to the same clutter.

In this particular test, we had three targets which we were going to try to get into an engagement window at the same time.

This was meant to stress the system in the way Dr. Friedman pointed out earlier. Our objective was to get three SM-2's in terminal homing at once.



This [indicating] is the range at AFWR, off Puerto Rico. This is what we had to do in order to get this test underway.

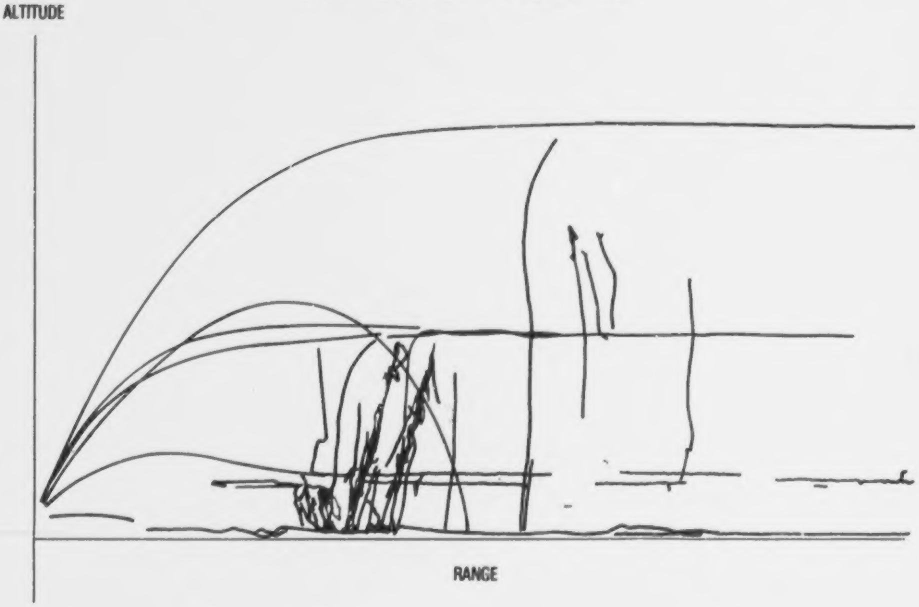
Basically, we wanted to have four or five targets approaching the ship as nearly simultaneously as possible. The first thing we had to do was launch an A-6 aircraft, fly it out about a hundred miles from the site, refuel it in midair, and have it get ready to launch a high altitude AQM-37 missile.

At the same time, we launched a QF-86, a drone aircraft, from the airfield at Roosevelt Roads. A few minutes later off of JATO bottles, we launched four BQM targets, and then controlled them out to various positions in order to set up this scenario: fundamentally two targets attacking the constructive carrier behind *Ticonderoga* and three targets attacking *Ticonderoga* herself.

Again, the purpose was to get the maximum number of missiles in the air at one time.

The next slide shows how we did.

SPY DATA 14 SEP 83



This is a viewgraph of the actual computer printout taken from the SPY radar on September 14. The blue tracks are the target tracks. You can see that this very closely approximates the viewgraph that Admiral Walters just showed you.

This target [indicating] is the AQM-37 coming in high. There are two targets on this track. One of them is the drone aircraft, and the other is the BQM-34.

Down here, at very, very low altitude [indicating] is another one of the BQM-34 flying at approximately 50 feet.

The system, would normally, in its operation, take each of these targets at maximum range in turn. We told the system it was not allowed to fire until a range smaller than that, when the targets would be lined up. We forced the system to do a simultaneous engagement.

That is one of the development test control factors that is not "real war". To get this situation to occur in real war, you probably would have to fly a dozen targets to get the probability that three of them will be in the right window at the right time.

Now the missile engagements proceeded as follows. Once the ship was free to fire, it launched four standard missiles simultaneously. That becomes very clear with the movie. The first one went up and took out the AQM-37, and what you see here is the track of that drone coming down [indicating]. This is debris from the missile as it falls back to Earth.

The second missile goes out and intercepts the BQM-34 and takes it out. This [indicating] is the debris from that track, as it falls down. The SPY radar generally makes a kill assessment based on the amount of debris it sees.

In the next engagement here [indicating], the missile here hit the drone, which is a full-sized aircraft, and that drone went down this way [indicating].

Now, as any airplane pilot will tell you, that is a standard evasive maneuver. It looks very much like a standard evasive maneuver for avoiding a missile.

So, the system evaluated that the target "survived." It fired another missile. This one does not show up in the movie, and it intercepted the target here [indicating] just before it hit the ground. It totally destroyed the target. Here is the debris from that [indicating].

While all of this was going on, the 50-foot target had come across the horizon and at the radar horizon, was detected. This fourth engagement is the fourth one you will see in the movie. A missile was fired, it went out and intercepted the target a few miles after it had crossed the radar horizon. What happened here is one of the missile failures that we have been experiencing as we attempt to employ this missile at the edges of the boundary, where it is designed to work. We got a failure. The target survived and continued on in.

In this case, the crew took the time to evaluate that it really was a "survive" [indicating], and finally let the system go.

The last shot you will see in the movie will show this missile going out to here [indicating] and intercepting the target at a range of a few miles from the ship.

While they are setting up the movie, I guess I would like to cover a couple of the other topics that were brought up, for example, the number 200 and the number 18.

Admiral Walters asked me to remind you that this was a developmental test.

I personally do not find anything much less stringent about that test. We could not practice it beforehand. There was no way you could practice that test. We had to get it right the first time.

I wanted to talk about the number 200.

The number 200, or a number above that is the number associated with the maximum number of tracks that can be in the track file at any one time. I am certain that if we look at the Mediterranean data, we will find times when there were that number or more in the file.

If the file goes over the maximum number, it begins to drop out unimportant tracks—friendly aircraft that are outbound, things like that. So, it keeps itself below the maximum.

The number has to do with the number of missiles that we can control simultaneously in the air at one time. The ability to demonstrate that is limited by the kind of range operations I just showed you on the chart. So, we use a simulation to demonstrate that.

That is the nature of those two numbers. I hope it clears up the fact that we do not try to engage 200 targets simultaneously, just keep track of them.

This is our film.

[A film was shown.]

Captain DONEGAN. These are not the particular shots. This is just a little commercial in the beginning.

These are part of the 55 firings on *Ticonderoga*. Here you see four simultaneously, one forward, one aft. This is in real time. They are fired and about 20 seconds later, one forward and one aft are fired. There we are. Those are the four missiles en route to their four targets.

That is how long it takes to do the test.

This is the same shot looking straight up at the deck [indicating]. You can see them turning over toward their targets there. The one to your bottom right is the one headed for the low altitude target. We don't have the intercepts on here.

There is your low elevation shot. This is the sixth shot in the series. As I said, we don't have the fifth. Here it is, going out. You are looking right down the tail of the missile. Watch closely and you will see, at about 3 miles from the ship and about 50 feet above the water, there is a hard intercept.

I think in *Aegis* we have concentrated on our engineering excellence. We put good engineering into the system to start with. We test to determine that it is there. Testing has never made a system better. It might reveal deficiencies. It might reveal things you have to work on. But it never made a system better.

Only the fundamental engineering that you put into the system in the beginning will prove the worth of that system in the first place.

Through this kind of testing—which, incidentally, has all been done by standard Navy crews, at the CSED site, White Sands, aboard *Norton Sound* and aboard *Ticonderoga,* for the last decade—we have never used anything except sailors to demonstrate the operation of our system, both to ourselves, and to OPTEVFOR.

DEVELOPMENTAL OPERATIONAL TESTING

Senator COHEN. Congressman Smith made, I think, the statement or the suggestion that developmental testing and operational testing are quite different, sort of like batting practice versus being in the game, or shooting skeet as opposed to going on a duck hunt, or warming up before playing and the real basketball game.

What is your assessment of that veiw with respect to *Aegis* developmental and operational testing?

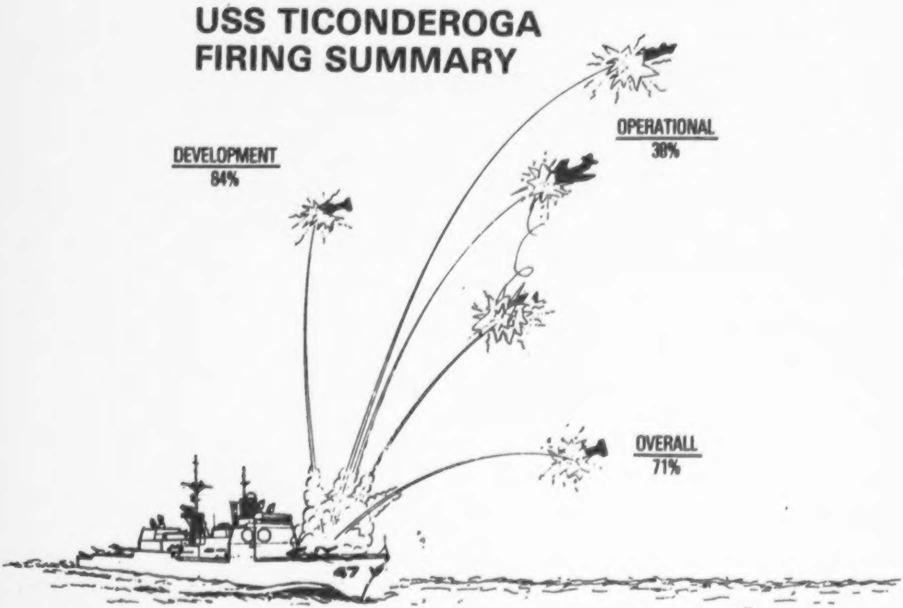
Captain DONEGAN. As I said, our developmental testing is as realistic as we can make it. We always have a test objective, and we control the conditions. If we have a failure, we will stop, and in OPEVAL, if you have a failure, you will continue. You may experience the same failure several times, and we have had that happen to us in the spring series and in the fall series. Some of those failures are actually duplicates of each other. It's like getting the same question wrong twice on a test.

Senator COHEN. Tell me about the failures, how they were broken down and how they have been corrected. Tell me about the captain who fired a shot when the computer said don't shoot.

Captain DONEGAN. All right.

The failures, as have been pointed out here, were divided into three categories.

Let me get that slide for you.


USS TICONDEROGA FIRING SUMMARY

We covered these numbers earlier today. In the development test that we have done, on *Ticonderoga* alone we have a score of about 84 percent, 38 percent in the operational test, for an overall of 71.

May I have the next slide.

OPEVAL Corrections

System problems: occurred in April; corrected in July; none recurred since.

Human factors: 1 in April, 3 in September; corrected; no recurrence.

Missile failures: known problem in older test missiles; not unique to *Aegis* ships; corrected in current production missiles.

The tests have been divided into three problem areas: system problems, all of which occurred in April, human factor problems, and missile failure problems.

Senator Cohen. All right.

Captain Donegan. The first one, system problems, Dr. Friedman accurately described these.

We, for a couple of years now, have been at third order correction level in the computer programs we have on the ship. These problems that occurred in this system—and I don't want to discuss them intimately in open session because they relate to how we do the tactics in the computer program—but they were the kind of problem where you had to do a minor software change, test that change, and then reintroduce it back into the ship.

We introduced it into *Yorktown* at the same time, exactly as Dr. Friedman described.

That has been the nature of those tests.

We have seen other things of the same magnitude in other testing that we have done, and we have corrected them along with this. As a matter of fact, the program that brought these changes to the ship also had a few other things in it that we had found as a result of our regular testing.

So, that is the nature of the level of these kinds of tests.

Now, certainly, it caused a failure. There is no doubt about that. And, had the exact scenario that caused this failure occurred some other time, it might have caused a failure then, too. The nature of these failures is very probabilistic, having to do with the relative location of the target, the jammer, and the conditions under which the logic functions—you see, it is through the computer program that the logic functions. So, it is not deterministic that it would have failed every single time. But it failed that time, so we changed the computer program.

Next are the human factors. You already have discussed one. The commanding officer's objective in the test given to him by OPTEVFOR was to defend the carrier. The carrier was behind him, much as it was in the shot that I showed you earlier.

The target came over the horizon. It was low. It was far away. He had an equipment problem which caused him to be late with his first shot, but he got it off. It missed. It is the kind of missile problem we have been discussing or that we will address here later on.

He got ready to shoot again, and the system told him that he was out of time, that the missile would get there a little bit late. But his job was to defend the carrier. So, he went ahead into what we call engageability bypass and fired the missile. It was a correct tactical decision. Admiral Carter has said it was a correct tactical decision.

Nevertheless, the target and the missile got together a few feet apart over the horizon, and the engagement was never completed.

That gets scored as a failure.

Senator COHEN. So, the system was correct.

Captain DONEGAN. The system was correct in saying that you would miss.

Senator COHEN. And he was correct in taking that action.

Captain DONEGAN. Right, he was correct.

Senator COHEN. In essence, he was taking a chance, saying look, the system says it won't work, but I don't have that kind of discretion. I have a valuable ship to protect, and maybe it will work and maybe it won't work, but I have to take that chance.

Captain DONEGAN. That's right. And it is all probability, because the system is based on an 85-percent probability of success. It has a probability built into its decision process also.

Senator COHEN. If you had been grading him as an officer, you probably would have graded him as a failure had he not exercised the discretion to fire.

Admiral WALTERS. He made the right decision.

Captain DONEGAN. Yes; he made the right decision. If he had not fired, he would have been graded down for it.

Senator COHEN. So, we have two corrects and still a wrong, in essence. It is rather Orwellian, isn't it?

There are two parts—a computer system and a person, who have done the right thing, but it comes out as a failure.

Admiral WALTERS. That is correct. But that just demonstrates the complexity of these kinds of tests in this kind of system.

Captain DONEGAN. And the fact that the scoring procedures are established by the Operational Test and Evaluation Force, and they report directly to the CNO. We do not control that project.

Let me finish the last of the human failures, which I think also have been discussed a little bit this morning. After a maintenance action, the crew did not perform a test on the particular SPY face that was involved in the maintenance action.

They went to sea. They tracked a large manned aircraft raid, which was discussed, with the ship. All of the aircraft in that raid were tracked. Most of the aircraft in that raid, all of the aircraft in that raid that were engageable, were engaged with simulated missiles. And so, the crew had no reason to think that the system was performing inadequately.

They conducted, in the clear, a missile engagement with that system, and it had a successful shot.

Later that day, in a jamming environment, the only three targets that we have never detected with this radar, the only three that ever have gotten by us, came down and passed by the ship. At that time, Admiral Carter knew they had a problem. They went and looked at the system, and the system was telling them that that radar was not operating properly. But they did not believe it. It is a matter of the amount of experience that they had had with the ship.

We have pointed out several times that this was a new ship with a new system. They were in a new situation. It was incredible to them that the system could be as far off as the maintenance program said it was.

So, again, you had a dichotomy. All the external indications said that the system was working fine. The built-in test system said it was not. In this case, it turned out that the built-in test system was right.

I would expect that, if we were to go back, we've corrected that in the sense that we emphasized those types of things in our training, we have increased the automatic check process involved in that particular test, we have emphasized with the crew that they have to do the maintenance procedures. I would expect that if you were to back around that again, you will find that problem solved.

Senator COHEN. So, in that case you had a human error initially, when failing to do the correct maintenance work?

Captain DONEGAN. Right.

Senator COHEN. And you had a computer which functioned properly, saying you guys have a problem.

Captain DONEGAN. Yes.

Senator COHEN. And then we have another human error in disbelieving the computer.

Captain DONEGAN. And so, in this case, again, three targets were missed. This is another case of getting the same question wrong three times.

Now, when you only fire twenty shots and you have a number of these multiple errors, the box score goes down pretty fast.

On a development test because we control the conditions under which we test, we would have stopped at the first one, and the box score would not have been as bad because the other two never would have happened.

So, that is the nature of the difference between development test and operational test.

As far as Congressman Smith's analogy is concerned, I don't think it is as much batting practice versus being at bat so much as I think it probably is more like, well, D–T's are like spring practice and O–T's are like the regular season; or, if you want to take that one more step, D–T's are like an inter-squad game and O–T's are like spring practice, and real war is like the real game.

Senator **Cohen**. What you have is the Redskins in spring practice, in D–T's, and then you have the Redskins in the Super Bowl, as far as the real war is concerned.

Captain **Donegan**. That probably is a more accurate analogy. It is not nearly as artifical as the mental impression you might get from some of the descriptions.

Again, I would like to emphasize that we use the regular crews.

MISSILE FAILURES

Senator **Cohen**. Tell me about the missile failures.

Captain **Donegan**. The missile failures are not unique to *Aegis*. There are problems that are the result of designing the system that is in this missile over the last decade to perform against the targets as we have known them.

Senator **Cohen**. Let me interrupt you just for a second—as I have been doing all along.

There are still some members of the press here and I think it important to point out that I agree with your statement, that the purpose of having operational test and evaluation is to correct some of the problems that we had.

I recall what happened during the testing of the Pershing II missile. Reports and photographs kept appearing in the various national magazines indicating another failure. There was a call in the Congress to delay the funding.

Of course, we had another problem there. We had a problem in terms of a two-track agreement with our European allies that would deploy the missile, as of December 1983, unless we could negotiate a treaty. Pressure was immediately put on not to fund the Pershing II until you complete all of the testing at 100 percent.

That was one case where we resisted that temptation. We said no, the purpose is to test it, knowing it is going to be deficient, knowing you are going to have some failures. That does not mean you cancel the system. That does not mean that you delay it beyond an IOC. It means that you correct the deficiencies.

I think perhaps that has to be placed in this kind of context. That is, if we have missile failures, we expect to learn by those mistakes and correct them.

Captain **Donegan**. And we are doing that. We have a very aggressive missile fuse improvement program underway right now, and the SM–2 block 2 ammunition which we recently have put into production will have a fuse that will perform better at lower altitudes than the fuses in the SM–2 block 1 and the SM–1 block 6.

Dr. Friedman put it exactly right: The nature of the problem is the confusion between where is the target and where is the surface of the water when you are trying to get in very close to the surface of the water.

We understand how to improve that. Again, it is a matter of building the engineering into that missile and then going out and testing it.

We also understand how to use that fuse in a longer term improvement program to support very, very low and very fast engagements. As you asked earlier, if the Soviets decided to change the mix between high and low, would we be prepared to handle that? The fuse program, the ammunition program, that we are putting into place now as a result of these and other tests that we have seen, would lead you to believe that we will be able to do that. What we need, of course, is your support to keep those programs going as rapidly as possible.

These tests have only served to highlight that.

Senator COHEN. Thank you very much, Captain.

We may need to go into a closed session, but we cannot do so at this time.

As in our past hearing on the submarines, I will set a separate date so that any questions that need to be clarified in closed session can be so clarified, with, perhaps, a discussion of page A-29. I don't want you to think there is any conspiracy going on here, but I have a speech to give at 12:30 in the Ticonderoga Room. [General laughter.]

Before adjourning, though, I have some questions from the members of this committee which we would request you answer for the record.

[Questions with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR WILLIAM S. COHEN

NAVAL TACTICS

Senator COHEN. There is a report by a government agency, not part of the Department of Defense, which says that naval tactics involving ships with radar, such as the Aegis cruiser, will soon become out of date. The report says future tactics will emphasize dispersed ships and radar silence. What do you have to say in response.

Admiral WALTERS. Current and future naval tactics emphasize dispersion of forces and control of electronic emissions as part of the effort to deny and/or control the flow of information to the enemy. Such "cover and deception" tactics must be highly flexible and scenario/geography dependent to be successful. Our offensive maritime strategy will require Battle Groups to be able to close potentially hostile shores. Tactical cover and deception will be effective during transit but will require both active and passive radar as the force comes within range of enemy aircraft. In areas such as the Eastern Mediterranean, geography and constant surveillance will require a strong, active defense. Warships must be able to shift rapidly from total electromagnetic silence to an effective radar controlled offensive posture. They must also be capable of operating in blue water or near land, against heavy jamming and in coordination with other ships in a dispersed formation.

The Aegis combat system inherently has these qualities. The SPY-1 radar can at the touch of a switch shift from total silence to fully active and radiating. The SPY-1 and the Aegis command and control system enables a Battle Group Commander to, almost instantaneously, obtain a complete air picture and expeditiously direct his AAW forces. Aegis, rather than being "out-of-date", provides the flexibility to utilize innovative tactics while retaining the ability to provide the sensor, command and control, and firepower required for AAW area defense.

AEGIS TESTING

Senator COHEN. Admiral Walters, what requirement does the Navy have for guided missile warships to escort carrier battle groups and other surface ships?

Admiral **Walters**. The Navy's requirement for guided missile cruisers and destroyers is 100 ships to support 15 carrier battle groups, for surface action groups (SAGs), amphibious task force ships, and underway replenishment groups.

Senator **Cohen**. What problems were discovered as a result of the OPEVAL tests in 1983 of the U.S.S. *Ticonderoga*?

Admiral **Walters**. Three problem areas were identified: (1) System failures primarily the result of computer program logic deficiencies; (2) Human errors most of which resulted from failure to conduct a maintenance check, and (3) Missile failures.

Senator **Cohen**. What problems have been fixed, and what problems remain from the OPEVAL?

Admiral **Walters**. The system failures and human errors were easily and inexpensively corrected. All the system failures occurred during April and were corrected prior to testing in September. None have recurred. Human problems were addressed by improving documentation and training procedures. The missile problems are being corrected as a high priority effort in the Standard Missile Improvement Program.

MISSILE PROBLEM

Senator **Cohen**. Admiral Walters, what can you say about the missile problem?

Admiral **Walters**. The Standard Missile problem occurs [deleted]. The problems are associated [deleted], neither is a mortal flaw. [Deleted.]

The second area of concern is in the warhead [deleted].

Senator **Cohen**. Admiral Walters, what do you think of the Aegis system's capability to react to low altitude missile attacks, compared to the best available alternatives?

Admiral **Walters**. The Aegis system has no problems in reacting to low fliers. Like any at-sea radar system, AN/SPY-1A is limited by the radar horizon. However, the radar sees and reacts to low fliers in plenty of time to take them under fire.

[Deleted]. Almost all other systems have trouble "seeing" the target and the old adage applies—"If you can't see a duck, you can't shoot it". Certainly other systems could be built to replace Aegis; however, so far every alternative has either the same engineering tradeoffs (and therefore "reinvented" Aegis) or they have surrendered significant capabilities Aegis already has. Our experience is that it would take 5 to 10 years to develop, produce, and field an alternative even if there were one.

OPERATIONAL TESTING

Senator **Cohen**. Admiral Walters, what do you think of the suggestion that a lead ship of a new class should undergo operational testing before funds are provided for the second ship of that class?

Admiral **Walters**. It is unprecedented and unnecessary. No large class of ships ever constructed by the United States has followed this philosophy. For example, before the first trial on the lead ship, funds were appropriated for the following ships: FFG 7—18 follow ships before trials; FF 1052—46 follow ships before trials; DD 963—30 follow ships before trials.

In the case of CG 47, only 9 follow ships had been appropriated before trials.

We should recognize that much of shipbuilding is a "construction" industry and not a "high risk" endeavor. Most of the risk in modern warships is associated with new technology weapons and equipments. These we engineer, build and test thoroughly before we ever commit to a ship. For example, years of development and operational testing of the Aegis Weapon System ashore and in U.S.S. *Norton Sound* (AVM 1) were the basis of the 1977 decision to proceed with the *Ticonderoga* class.

OPERATIONAL TEST AND EVALUATION PROCESS

Senator **Cohen**. Admiral Walters, how would you describe the integrity of the Navy's operational test and evaluation process?

Admiral **Walters**. Operational Test and Evaluation (OT&E) is accomplished by the Navy's independent Operational Test and Evaluation Force (OPTEVFOR). The U.S. Navy has championed the evolution of OT&E and OPTEVFOR is the finest, most professional OT&E organization in the world. OPTEVFOR is completely independent of the development and production organizations, reporting directly and personally to the Chief of Naval Operations and the Secretary of the Navy.

Senator **Cohen**. Admiral Walters, do you agree with Congressman Smith that the Navy has been more than willing to share its successes, but reluctant to share its failures? What are your thoughts about that?

Admiral **Walters**. I do not agree. To the contrary, the Navy has provided the Congress accurate results of all tests conducted to date on *Ticonderoga*. These have included not only our successes, but also those tests which are less successful. For security reasons, specific test results, both positive and negative, have been withheld from the general public.

DEVELOPMENTAL AND OPERATIONAL TESTING

Senator **Cohen**. Admiral Walters, what is the difference between developmental and operational testing? What do you think of the assertion that developmental test are not relevant in evaluating the capability of the Aegis cruisers?

Admiral **Walters**. There is generally little difference between the two types of tests, and even less difference on Aegis ships since we required Naval officers and sailors to perform both types The fundamental difference is generally one of emphasis and is related to these four areas:

(1) Who's in charge—generally, developmental tests are run by the Naval Sea Systems Command's Project Manager while operational tests are run by the Commander, Operational Test and Evaluation Force.

(2) Methodology—generally, development tests are stopped when failures occur in order to isolate problems and fix them before proceeding. Operational tests continue, often resulting in numerous failures attributable to the same reason.

(3) Purpose—developmental tests are usually conducted to certify that the system meets design specifications. Operational testing may be designed to stress the system beyond design specifications or to establish "inherent" capability. Often, a system has more capability than was originally specified in design.

(4) Context—operational tests are based on developmental tests. COMOPTEVFOR personnel have been involved in every significant test on Aegis across the years. They use the developmental tests to help them form their opinions and to design their tests. For example, they may not retest something tested in development or they may not test it as much, because of what they already know.

Again, the differences are a matter of degree and emphasis. For example, the crew usually has more information about the targets and profiles in development tests than in operational tests. In Aegis, this advantage is negated by the fact that the radar has been "seeing" almost all the targets in plenty of time to make prior knowledge meaningless.

TARGET PRACTICE AGAINST TICONDEROGA

Senator **Cohen**. Admiral Walters. How do the targets flown against the *Ticonderoga* during OPEVAL testing compare to actual Soviet anti-ship missiles? Would you comment on the allegation that your targets flew slower and higher than known Soviet missiles.

Admiral **Walters**. The Aegis Weapon System has been tested against targets which represent the threat today as well as what we judge it will be tomorrow. In all, [deleted] the current Soviet missile inventory and [deleted] their inventory projected for the 1990's has been represented. In a large percentage of cases, our targets are more stressing then the actual threat itself. The majority of targets used against Aegis [deleted] are more difficult to counter.

To date, our poorest target representation [deleted]. The low altitude used to test the Aegis system have been slower [deleted] because no target exists in the current U.S. inventory which can completely replicate it's profile. This target is now in development and will be ready [deleted]. We will come very close [deleted] with the introduction of the Vandal (ER) target.

MUTIPLE TARGET RAIDS

Senator **Cohen**. Admiral Walters, a major U.S. newspaper said the *Ticonderoga* was testing against only one target at a time. What comment do you have on that?

Admiral **Walters**. This is an incorrect statement. Multiple target raids were presented in all Opevals and have been engaged in numerous developmental tests.

Senator **Cohen**. Admiral Walters, there is a report by a Government agency, not part of the Department of Defense, which says that Naval tactics involving ships with radar, such as the Aegis cruiser, will soon become out of date. The report says future tactics will emphasize dispersed ships and radar silence. What do you have to say in response?

Admiral **Walters**. I'd say the author of the report is ill-informed. While it is true dispersed formations are at times used and radar silence is used at times for surreptitious or clandestine transits, a modern Navy Carrier Battle Group does not establish and maintain sea control in total radar silence. There is absolutely no sense in remaining radar silence once the force has been detected and to do so would be foolish and put the force at great risk. Aegis ships are not at risk of becoming obsolete. In fact, they have the only weapon system fully capable of defending a Carrier Battle Group from anti-ship cruise missiles which leak through from the outer air battle. The author of this report needs to do further study on the subject.

IMPORTANCE OF OPERATIONAL TESTS

Senator **Cohen**. Admiral Walters, ships take about 5 years to build. Operational tests are important. What measures do you take to reduce the risk that complete ships will suffer problems?

Admiral **Walters**. The Aegis ships reflect our lessons learned in building the CGN 36/38 classes, FFG 7's and DDG 963's. Those lessons stress the building of mock-ups and prototypes, testing both at-sea and ashore as rigorously as possible, pursuing the discipline of system engineering and centralizing management responsibility.

In the case of Aegis, testing (both developmental and operational) had been ongoing for some 5 years before the lead CG 47 was authorized. We build two prototypes of the Aegis system and began subjecting them to rigorous testing very early on. One of these systems has been in U.S.S. *Norton Sound* (AVM 1) for almost ten years. The other has been at the Combat System Engineering Development Site in Moorestown, N.J. since 1976.

Both in *Norton Sound* and at Moorestown, we were past the "knee" of the learning curve before construction ever began. In fact, *Norton Sound* had fired 28 missiles from her Aegis system before the Congress appropriated money for *Ticonderoga*. During construction, engineering and testing continued and, as expected, changes occurred with minimal additional expense. It was a deliberate and thorough process; the result has been a well designed and thoroughly tested ship, which incorporates the benefits of years of methodical developmental and testing.

OPTEVFOR

Senator **Cohen**. What is the history involving David Packard and the establishment of the Navy's Operational Test & Evaluation Force?

Admiral **Walters**. The Navy's Operational Test and Evaluation Force (OPTEVFOR) was created in July of 1945 as the "Composite Task Force, U.S. Atlantic Fleet" to develop and test anti-kamikaze tactics and equipment. Through the years this role continued to expand to include the testing of new systems introduced into the fleet with the Operational Development Force (OPDEVFOR) (1974) reporting test results directly to the CNO. The name again changed to OPTEVFOR, (1959) when operational test and evaluation became the organization's primary mission.

In 1970, as a result of Secretary of Defense Packard's Blue Ribbon Panel and other high level reviews, actions were taken which completely changed OPTEVFOR's organizational chain of command and expanded the primary mission. It was concluded that a principal means of control needed in the material acquisition process was an independent operational test and evaluation agency, having no ties to either the developing command (NAVMAT) or the using command (the Fleet). In 1971, in addition to his existing duties, a high priority mission of "early assessment of operational effectiveness and operational suitability of new weapons systems—prior to the production decision" was given to COMOPTEVFOR and operational control was changed from CINCLANTFLT to the CNO.

AEGIS TESTING

Senator **Cohen**. Admiral Walters, would you summarize the reasons why you think the Navy is pursuing a prudent and adequate testing program for the Aegis cruiser program?

Admiral **Walters**. Our problem in developing any major weapon system is to balance follow ship production risk with confidence in the system's performance. Congress has been an intimate partner in working that equation with us for Aegis.

Recognizing the nature of Aegis, the production program was stretched out: (1) The system was in development for almost 8 years before the country committed to building the first ship; (2) Initial ship construction was slowed to one in 1978, none in 1979, and one in 1980. This was far below our industrial capacity; (3) Total ship appropriations were limited to 10 ships before *Ticonderoga's* first seatrials.

In the meantime, we embarked on a lengthy and expensive engineering and test program to ensure confidence in the system's performance.

The Aegis test program has been one of the most comprehensive and demanding of any new development undertaken by the Navy. The system underwent over 8 years of shore-based testing at the Combat System Enginering Development Site in Moorestown, N.J., and almost 9 years of at-sea testing in U.S.S. *Norton Sound* prior to the commissioning of U.S.S. *Ticonderoga*. These tests fall into four categories: engineering tests, environmental tests, developmental tests and operational tests. The purpose of this structured testing program was to ensure that no major flaws existed which would jeopardize the ships once built. The testing program, including OPEVALS, both on *Norton Sound* and at CSED Site, has validated our approach. No major modifications have been discovered to date that affect follow ships construction.

Senator COHEN. Admiral Walters, are you concerned at all that the Aegis cruiser would not be capable of defending against low-flying aircraft equipped with EXOCET missiles, either as part of a carrier battle group or operating alone?

Admiral WALTERS. No. The very nature of the Carrier Battle Group makes a successful attack on this type extremely difficult. The Navy uses a defense in depth concept. Combat Air Patrol (CAP) provide the first outer defense zone to detect and engage hostile aircraft well before they can get within striking range of the Battle Group. If, in the event an aircraft penetrates the outer perimeter, it would be subject to multiple engagements by Aegis ships as well as our older missile ships. There is high probability that a launch airplane would be destroyed prior to an Exocet launch. However, assuming Exocet was successfully launched, the missile would also be subject to multiple engagements by Aegis ships. Finally, each Battle Group ship is equipped with self-defense measures such as electronic countermeasures and decoys to mislead the enemy missile during terminal approach also weapons such as Phalanx and NATO Seasparrow are installed to engage the EXOCET in the unlikely event that it was able to penetrate all other defenses.

AEGIS CAPABILITY

Senator COHEN. Admiral Walters, how would you rate the safety of the crew aboard an Aegis cruiser facing an air attack compared to crews on other guided missile ships in the U.S. Navy or any other Navy?

Admiral WALTERS. They are much safer. Not only are Aegis crews safer, but crews in other ships are safer if an Aegis ship is around. Aegis ships have a far greater capability than our other ships to defeat air attacks and to defend other ships in the force.

Senator COHEN. Admiral Waters, do you think the Aegis cruisers and destroyers are designed to be unnecessarily complex, or to do too many things?

Admiral WALTERS. No. Managing a battle alongside other surface combatants, support ships, submarines and aircraft in the extremely diversified environment we deal in can be extremely demanding and complex. Aegis equipped ships are capable of sorting through these complexities and make the battle simpler and more manageable. The present of *Ticonderoga* on station in the Eastern Mediterranean greatly enhanced battle group coordination and eased the burden on other ships there. According to Rear Admiral Berry "for the first time, we are managing the air picture rather than reacting to it". Morevoer, we have shown that average sailors adequately trained can competently operate and maintain the Aegis system. They have done so for many years at the Combat System Engineering and Development Site a Moorestown, N.J., in U.S.S. *Norton Sound* and now in U.S.S. *Ticonderoga*.

AEGIS

Senator COHEN. What do you think would be the impact on our Navy if Congress did not fund the three Aegis cruisers and the one Aegis destroyer in this year's budget?

Admiral WALTERS. The Aegis Combat System installed in the CG-47 class cruisers and the DDG-51 *Arleigh Burke* class quided missile destroyers is the only system in the world capable of defeating the Anti-Ship Capable Missile (ASCM) threat which the Navy faces. Failure to fund these ships in fiscal year 1985 would be a clear signal to the Navy and to our allies and adversaries that the Congress was unwilling to pay the price to achieve and sustain our national maritime strategy. This is particularly true in the case of the lead DDG-51 where delay in construction will exacerbate the block obsolescence of guided missile destroyers which begins in the early 1990s.

AEGIS TESTING/DDG 51 GUIDED MISSILE DESTROYER

Senator **Cohen**. Admiral Walters, do you think there are any fundamental problems with the design of the Aegis combat system?

Admiral **Walters**. No. The design of the Aegis Combat System is sound—ther result of many years of disciplined system engineering from our best professionals in both industry and Government. Almost all our fixes have been minor in nature and amount to "fine tuning."

Senator **Cohen**. Admiral Walters, do you think the Aegis system is so complex that new problems of significance will be uncovered as earlier problems are corrected?

Admiral **Walters**. No, our exhaustive 15 plus years of engineering and testing give us confidence that no such "gremlins" are there.

Senator **Cohen**. Admiral Walters, what is the fleet's opinion of the *Ticonderoga*'s performance off the Coast of Lebanon?

Admiral **Walters**. Spectacular. *Ticonderoga* performed superbly in the Eastern Mediterranean. She was on station for 120 days with no system down time. She reduced unidentified air contacts to near zero. Her performance prompted the Air Force to turn over air traffic control to *Ticonderoga*. Combat Air Patrol launches were dramatically reduced, reducing aviation fuel consumption. She operated around the clock, day in and day out, in spite of the fact that only about three hours of stand-down per week were alloted for maintenance.

Senator **Cohen**. Admiral Walters, what are the financial factors which lead you to favor construction of *Arleigh Burke* class destroyers instead of building an equal number of *Ticonderoga* class cruisers?

Admiral **Walters**. To build an equal number of cruisers would cost approximately $13 billion more in ship construction costs and require nearly 1400 more men to operate them. The additional capacity afforded by the cruiser is not required to fulfill destroyer missions. Destroyer numbers have been carefully evaluated and based on the force levels and capabilities provided by other classes such as CG 47, DD 963 and FFG 7.

RIF'S AT NAVAL SHIPYARDS

Senator **Cohen**. Admiral Walters, in discussing the battleship reprogramming request, you mentioned that Long Beach Naval Shipyard is about to execute RIF notices issued to employees. If you issue RIF notices on a given date, when do you normally lay off the workers?

Admiral **Walters**. DOD policy is that a 60-day notice be provided to employees prior to the effective date of the RIF. In the case of Long Beach Naval Shipyard, notices were issued in three increments beginning on January 16, 1984 for phased reductions beginning on March 16, 1984. To date, increased attrition and reassignment of personnel have enabled retention of employees scheduled for release thus far. It is hoped that most remaining employees who would be affected will also be reassigned.

SUBMARINE MISSIONS

Senator **Cohen**. Admiral Thunman, the Navy obviously has many different missions for its nuclear powered submarines: anti-submarine and anti-surface ship warfare using torpedoes, rockets, and cruise missiles, while deployed on independent patrols, barrier operations, and in support of other units of the fleet.

How will this new design submarine fit into those missions, and why won't the existing submarines or some other design do just as well?

Admiral **Thunman**. U.S. maritime strategy requires that virtually all attack submarines be capable of multiple mission operations. The New Design SSN has been designed with the specific objective of providing a submarine which will ensure a margin of undersea superiority sufficient for the U.S. to implement its maritime strategy. This submarine is an excellent design for execution of the multiple missions required by our warplan, taking full advantage of the U.S. technological superiority in submarine warfare. It will be sufficiently capable to prevail in all mission areas while providing the operational flexibility we need to counter the Soviet 3-to-1 numerical advantage. This multi-mission submarine also forces the Soviets to guard against a variety of situations which the New Design SSN can create by virtue of its versatility.

The Soviets have pursued a massive R&D and construction program involving multiple designs, modernization and rapid introduction of technology. [Deleted] new classes of submarines were introduced while we were introducing just the 688 Class.

These new classes have served to steadily improve Soviet firepower, sensors, and sound quieting.

Our current 688 Class submarines will not enjoy an adequate margin of tactical superiority to prevail in repeated engagements against the larger numbers of increasingly capable Soviet submarines beyond the year 2000.

We currently have an aggressive 688 Class Improvement Program. This program will yield increased quieting and improved sensor performance and will provide the 688 Class with significant military improvements in the form of an arctic capability, a mining capability and a vertical launch system.

It is clear now that while the Improved 688s will be capable against those ships which the Soviets will produce [deleted].

100 ATTACK SUBMARINES

Senator **COHEN**. Admiral Thunman, the Navy has talked about the need for the 600-ship Navy and how a force of 100 nuclear attack submarines is an integral part of that fleet.

How did you decide on a 100-submarine force goal, and why is that particular number so important?

With more-capable new-design submarines would you be able to accept a lower number to contain costs?

Admiral **THUNMAN**. Our goal of 100 SSNs is based on careful analysis and projection of the Soviet Navy threat in the context of a balanced and affordable 600-ship Navy. The larger proportion of highly capable, new design Soviet nuclear attack submarines in their fleet and the aggressive submarine modernization program which they have undertaken are significant indicators of Soviet determination to wrest undersea superiority from the United States. Additionally, we see their submarines engaged in new missions and frequenting our waters with much greater regularity. These trends place the importance of our attack submarine force in clear perspective.

The number of 100 highly capable multi-mission attack submarines is a valid force level goal based on execution of our warplan for today and for the projected threat of the 21st century.

NEW-DESIGN VERSUS IMPROVED 688

Senator **COHEN**. Admiral Thunman, you are already asking for four improved 688-class submarines in this budget.

Why not be content with those submarines? Why is it so important to begin to design a new class of submarines when we are improving the 688 and building it in very significant numbers?

Admiral **THUNMAN**. We currently have an aggressive 688 Class Improvement Program. This program will yield increased quieting and improved sensor performance and will provide the 688 Class with significant military improvements in the form of an arctic capability, a mining capability and a vertical launch system.

As I have indicated, the four improved 688 Class ships requested in the fiscal year 1985 budget will be extremely important additions to our submarine force because of the increased capability which they possess. I would estimate that each of these ships have about twice the capability of the original 688 Class designs. As such they are truly force multipliers and are important factors in countering the increasingly capable Soviet new design submarines.

[Deleted.] Therefore, we must proceed now to develop our new attack submarine, the SSN-21 which will be capable of engaging the very formidable submarines which the Soviets will develop and put to sea in the future.

WHY AUTHORIZE IN 1989

Senator **COHEN**. Admiral Thunman, we are faced with a rather large economic problem as we review this budget, and the R&D for this submarine could play a significant role in that problem over the next 3 to 5 years.

Why is it so important for the new design attack submarine to be ready for authorization in 1989 instead of one or two years later?

Admiral **THUNMAN**. The development of the threat posed by the Soviet submarine force has expanded dramatically over the last few years. The evidence is undeniable that the Soviets are determined to achieve undersea superiority through an aggressive submarine construction and modernization program. Our qualitative edge in submarine technology and undersea tactical superiority is eroding sharply. We feel that our efforts to regain our position of undersea supremacy are already late. Accordingly we must move now to bring the SSN-21 design to fruition as rapidly as is technically feasible.

In order to deploy the SSN-21 with the characteristics necessary to counter the Soviet threat well into the 21st century, current research and development efforts are required to develop essential capabilities and systems. These programs are funded to achieve the earliest technically achievable fleet introduction of the SSN-21 Class. Our plan to commence construction of new attack submarine in 1989 is achievable and very necessary to assure our ability to address the Soviet threat to achieve a position of undersea superiority.

In order to deploy a new SSN with characteristics which would meet the Soviet threat well into the 21st century, present R&D efforts are required to develop essential systems. These systems are funded to achieve maturity for a fiscal year 1989 authorization of the New Design SSN.

GREATER DEPTH AND SPEED

Senator **Cohen**. Admiral Thunman, ever since I have been the Chairman of this subcommittee, we have heard a great deal of the threat posed to the fleet by the Soviet *Alfa* class submarine. The threat has been posed in terms of the high speed of that boat [deleted], its deep operational depth [deleted], and the strength of its titanium hull. And yet here you are proposing a submarine that does or is none of these things.

Why? [Deleted.]

Admiral **Thunman**. Although the *Alfa* class submarine has greater speed and depth capability than our attack submarines, it is apparent that the Soviets are concentrating on other submarine characteristics such as [deleted]. The Soviets have recognized that improvements in these qualities, which have historically been the determinants of undersea superiority, are the characteristics which yield major improvements in combat capability.

With regard to the deep depth capability of the *Alfa*, there is no clear performance advantage for U.S. SSNs in going deeper than the operating depth planned for the New Design SSN. [Deleted.]

Higher speed capability in a submarine is not a true measure of its combat capability. "Fast" is a relative term. A submarine must be fast, [deleted].

The increased speed capability of the New Design SSN coupled with noise quieting features and sensor improvements will [deleted].

SMALL VERSUS LARGE

Senator **Cohen**. Admiral Thunman, the Navy is frequently criticized because it always seems to want to build bigger, more expensive, ships rather than smaller, less expensive, ships. This submarine seems to be another example of that.

How does the issue of size play in the equation when we are discussing the ability of a larger or smaller submarine to operate covertly, to operate in shallow water, or to maneuver in combat?

Admiral **Thunman**. Balancing the submarine warfighting capabilities and requirements for survivability, size is an asset rather than a liability in submarine construction. In a large ship it is possible to increase the degree of quieting which enhances the submarine's covertness. Larger and more sophisticated acoustic sensors may be installed increasing the probability of detecting a potentially hostile platform prior to being counterdetected. More firepower can be incorporated in larger hulls thereby permitting the larger attack submarine to engage more targets and endure longer on station in hostile areas. [Deleted.]

While there are some disadvantages to large size in terms of [deleted]. Furthermore, the benefits which can be realized from larger submarines and which contribute to the improved ability to detect and engage enemy ships and submarines far outweigh the disadvantages.

The Soviets are well aware of this fact and are moving rapidly to incorporate those qualities which they expect will yield high combat capability in submarines as large and larger than our New Design SSN. Therefore, it is incumbent upon us to move now to develop the New Design SSN to counter these new and more capable Soviet submarines now under construction.

NOISE COMPARISON: DIESEL VS. NUCLEAR

Senator **Cohen**. Admiral Thunman, the usual arguments that I have heard to support the construction of diesel-electric submarines is that when they are operating on their batteries they are significantly more quiet than nuclear powered submarines.

Could you comment on this argument and compare for us the differences between some specific modern diesel boats and our own 688 Class and new design submarines?

Admiral **Thunman**. Diesel-electric submarines are quiet, but not as quiet as modern nuclear attack submarines at comparable speeds. For example, [deleted].

Furthermore, diesel-electric submarines lack mobility. Our maritime strategy requires our submarines to be quiet, highly mobile, heavily armed and to possess the endurance to survive in the most hostile forward areas for long periods of time. Diesel-electric submarines simply do not have these qualities in sufficient measure to contribute adequately to our maritime strategy.

Therefore, not only is the modern nuclear submarine a quiet platform, but it brings to the arena of naval warfare combat capabilities that diesel submarines cannot incorporate.

EXPENSE AND DIESEL-ELECTRIC POWER

Senator **Cohen**. Admiral Thunman, there are those who criticize you who say that we have too great a reliance on expensive nuclear powered submarines, and that at least some portion of our submarine fleet should be diesel-electric powered, and here you are proposing a new design submarine that is again nuclear powered and more expensive.

How do you answer those critics and justify your proposal?

Admiral **Thunman**. U.S. maritime strategy is based on our submarines deploying rapidly to forward areas. [Deleted.] We must invest our valuable national resources in submarines which can execute our national strategy. [Deleted.] Further, the diesel-electric submarine would be highly vulnerable to detection and prosecution in transit and capable of spending but a fraction of time on station as compared to the SSN. The diesel-electric submarine has limited capability to maintain contact on the current threat where the SSN has optimum capability.

The differential in construction costs between diesel-electric submarines and SSNs becomes insignificant when compared to the vastly increased warfighting capability of the SSN. We must invest our limited national resources in submarines which can execute our maritime strategy. We do not have a mission for diesel-electric submarines and it would be unwise to divert our resources to building them.

NEW TECHNOLOGIES ON U.S. SUBMARINES

Senator **Cohen**. Admiral Thunman, you are often accused of not having much new to say in terms of submarine design. We hear that the Russians are using exotic materials and methods and are achieving fantastic results, and we are still just making marginal improvements after devoting quite a bit of R&D money to the problem.

What is the Navy doing to develop future submarine technologies, such as hull coatings, different propulsion, polymers, and the use of titanium, and why don't we see more of that on this submarine?

Admiral **Thunman**. The Soviets have attracted attention with their high speed deep diving *Alfa* submarine. We believe that they proceeded in that direction in an attempt to reduce the vulnerability of their submarines in view of the [deleted]. Conversely the U.S. submarine force has traditionally incorporated research and development progrms to achieve a balance of submarine design, combat system and weapon improvements to provide synergistic warfighting capabilities.

Clearly today we see that the Soviets are also focussing on those qualities of submarine design which have historically represented the determinants of undersea warfare. These characteristics have ben embodied in our post submarine designs and will be optimized in the SSN-21. But we are moving ahead in many research and development areas. Technologies that will be incorporated in the SSN-21 will yield:

[Deleted.]

As you can see, we have been pursuing advanced technologies, but continuing rsearch is underway to develop those technologies for later flights of the SSN-21 or even for future attack submarine designs. These efforts include:

[Deleted.]

U.S. submarine related research and development is designed to achieve dramatic advances in technologies which improve the warfighting capability of our submarines. These advances are not meant to "mirror" Soviet submarine developments, but to effectively counter the Soviet long term threat.

ALLIED SUBMARINE CAPABILITIES AND CONTRIBUTIONS

Senator COHEN. Admiral Thunman, the Secretary and the CNO recently discussed their Maritime Strategy before the Subcommittee, and they stressed that we are committed to a "coalition strategy."

Obviously then we must depend on our allies in wartime. How do you assess the capabilities of the submarine forces of the Allies, and will they be a credible addition in a conflict?

Is there any threat that we could find oursulves in a major conflict with the Soviets without having our Allies in the conflict as well? How well can our submarines do against the Soviets without the Allied contribution? Are there any other situations where the capabilities of our submarines would be taken to the limits because our Allies would not be participating?

Admiral THUNMAN. Capabilities of allied submarine forces have been assessed by considering the numbers of various types of submarines and their respective capabilities. These range from nuclear submarines [deleted] to small conventional coastal craft [deleted]. However each of these platforms provides a credible asset to our forces in a conflict.

The Joint Strategic Capabilities Plan, issued by the Joint Chiefs of Staff assumes that [deleted].

The missions assigned to [deleted]. The missions assigned to [deleted]. The two mission areas are complementary but not interdependent. U.S. submarines are fully capable to carry out their assigned missions [deleted].

SOVIET SUBMARINE FORCE TRENDS

Senator COHEN. Admiral Thunman, in an unclassified reply, identify the most significant changes and trends which you are observing in the Soviet submarine force.

Admiral THUNMAN. The Soviet Union is rapidly modernizing their submarine force to achieve undersea superiority. Specifically they have introduced twelve new classes of nuclear and diesel submarines to our two classes in the past ten years. Additionally they have converted strategic submarines to attack submarine configurations. In total the Soviets have 371 submarines.

Not only are the Soviets building more platforms but the new platforms represent significant technological advances. These ships are larger and have increased speed and depth capabilities coupled with reduction of radiated noise. The emphasis is on nuclear powered attack submarines carrying torpedoes and cruise missiles.

The Soviets have also increased the combat capability of their new platforms. They are equipped with improved sensors having greater detection capability. The new Soviet submarines have a greater weapons capacity with more new weapons having greater range and destruction capability.

Furthermore, these platforms are capable of new missions such as operation under the Arctic Ocean ice cap and attack of land targets with cruise missiles.

NOISE QUIETING

Senator COHEN. Admiral Thunman. Explain for the record why noise quieting is so important for U.S. submarines.

Admiral THUNMAN. The U.S. Navy has properly evaluated noise quieting as the major improvement which will allow the New Design SSN to enjoy a large acoustic advantage and thereby maintain tactical supremacy over Soviet submarines of the 1990s and beyond. Noise quieting improvements in the form of [deleted]. The increased standoff distance is a major factor in optimizing the mission capability of the submarine and gaining maximum advantage from the other tactical improvements. [Deleted]. The objective of these programs is to increase the capability of Soviet submarines to detect and track our SSBNs and our SSNs. [Deleted.]

DIESEL-ELECTRIC VS. NUCLEAR SUBMARINES

Senator COHEN. Admiral Thunman, what are the advantages and disadvantages of substituting diesel-electric submarines for construction of nuclear submarines, either at a permanent ratio of 3:1, or just up to a total of about six submarines? What initial acquisition or life-cycle support costs should be considered?

Admiral THUNMAN. There are no advantages to substituting diesel-electric submarines for construction of nuclear submarines at any reasonable ratio.

In recent years it has become increasingly clear that the issue of executing the U.S. national maritime strategy in a period of hostilities depends on our ability to inflict heavy losses against the enemy in the key forward areas of conflict early in the fight. In order to exact these losses, the U.S. must deploy a majority of our submarines to areas where the enemy is able to deploy a numerically superior force of surface combatants and submarines, enjoys air superiority and employs a layered ASW defense to protect vital sea areas.

A diesel submarine simply does not have the military characteristics to be employed in a role which supports a forward strategy. Specific deficiencies of diesel submarines, in this regard, include debilitating limitations in those key qualities of covertness, mobility and endurance which have historically been the most important factors in submarine warfare.

The diesel submarine is not covert. They are vulnerable to detection by every ASW detection scheme developed to date while snorkeling. Even on the battery today's diesels are more acoustically detectable than today's 688 Class SSN.

The diesel submarine is not mobile. Diesel submarines are unable to move rapidly to distant areas to respond to tactical opportunities. Additionally, experience has shown that this relative immobility allows nuclear attack submarines to localize and prosecute diesel submarines effectively. Once localized, virtually any ASW platform has a relatively high probability of destroying a diesel submarine because of the limited speed that a diesel can use to covertly evade its pursuers. Finally the diesel submarine is unable to fight in what has become the private domain of the nuclear submarine, the Arctic and ice-covered seas of the world.

The diesel submarine cannot endure in areas where the U.S. must gain undersea superiority. Notwithstanding its limitations in terms of lack of covertness and mobility in the stressing missions required of today's submarine force, the diesel submarine's size limits the sensors that can be installed, the quieting measures employed and, most importantly, the number of weapons carried. Furthermore the diesel submarine cannot support the modern high speed Carrier Battle Group.

A comparison of acquisition and life/cycle support costs of diesel submarines and nuclear submarines highlight the cost effectiveness of SSNs. In the Navy's 1982 Diesel Submarine design study, the lead ship cost of a diesel submarine was determined to be comparable with the follow ship costs of a *Los Angeles* Class submarine. Follow ship diesel costs would be around 56 percent of follow ship SSN 688s. The ratio of nuclear attack submarine life cycle costs to the life cycle cost of a diesel is about 1.75 to 1.0. This means two diesels would cost more than one SSN over ship lifetime.

Clearly the assignment of a diesel submarine to carry out missions in the context of U.S. maritime strategy would represent a wasteful and inefficient employment of our limited submarine assets. In those roles where mission requirements, tactical air superiority, geography and support forces permit the employment of a diesel submarine, the one hundred and forty diesel submarines of our allies could be utilized in a useful and cost effective manner.

CONSTRUCTION OF DIESEL SUBMARINES FOR EXPORT

Senator **Cohen**. Admiral Thunman, there was a suggestion that diesel submarines be constructed in U.S. shipyards for export. What do you know about this proposal and what do you think of it?

Admiral **Thunman**. I am aware that some of our allies have expressd an interest in buying diesel submarines built in the U.S. I do not recommend that the U.S. construct diesel submarines for export as such a program would have a very serious impact on the U.S. Navy nuclear submarine program. The U.S. base for submarine design, management expertise and construction resides solely in NAVSEA, supporting Navy laboratories and field activities and at two new construction shipyards, Electric Boat and Newport News. [Deleted.]

The preliminary design of the new attack submarine requires all available expertise. There is no commercial sector and our base [deleted]. In addition since the U.S. has not designed and built a diesel submarine in nearly thirty years, expertise from this effort is no longer available. [Deleted.]

NON-ACOUSTIC ASW

Senator **Cohen**. Another theme of criticism is that there is an increasingly dangerous threat to our submarine fleet from non-acoustic ASW technologies and that we are ignoring them in the pursuit of strictly more acoustic advantages. What are some of these technologies, and how do they threaten the fleet? What are we doing about them? Are the oceans becoming more or less opaque, and why?

Admiral **Thunman**. The U.S. Submarine Force is sensitive to the non-acoustic ASW threat and has programs to address that threat. [Deleted.]

The Submarine Force is pursuing efforts to further reduce vulnerability to non-acoustic sensors. In particular, programs exist for: [Deleted.]

The oceans are becoming more opaque to the Soviets due to aggressive U.S. submarine programs in both acoustic and non-acoustic signature reductions. Advanced acoustic sensor programs effectively counter the effect of Soviet quieting thus maintaining the qualitative advantage of the U.S. Submarine Force.

NEW DESIGN SSN

Senator COHEN. Admiral Thunman. As I understand it the House Armed Services R&D subcommittee has already marked up their portion of the defense authorization bill, and in doing so reduced a portion of the R&D for the New Design Submarine. What specific programs did they reduce, by how much, and what will be the impact of those reductions on the submarine program?

Admiral THUNMAN. Five program elements were reduced by House Armed Services R&D subcommittee marks. Those are:

	Millions
Submarine Silencing	$12.0
Submarine Sonar Development (ADV)	9.9
Submarine Arctic Warfare/Support Equipment Program	4.4
Tactical Warefare Systems (ADV)	4.7
Attack Submarine Development; SSN 688 Class Development	2.0

The reduction of $12 million in Submarine Silencing, about 40 percent of the requested funding, will not permit us to meet the sound quieting objectives for a fiscal year 1989 authorization for the new design SSN. Construction of a submarine platform quiet enough to prevail against the Soviet threat of the 1990s and beyond is absolutely dependent on achieving the submarine silencing goals laid out in this program. Specific areas affected are: Low RPM propulsor; Quieted piping system components; Quieted auxiliary machinery; and Quieted electrical components.

The reduction of $9.9 million in Submarine Sonar Development, about 32 percent of the requested funding, eliminates all funding for the advanced conformal submarine acoustic sensor element. This also eliminates the integration of development efforts for the improvement of submarine hull arrays. The large wide aperture array planned for the new design SSN will not be affected directly. However, the integrated effort to develop more advanced hull arrays with concurrent cost and weight reductions will be slowed. We need this steady development effort in sonar arrays in order to counter Soviet advances with our own step improvements.

The reduction of $4.4 million in Submarine Arctic Warfare/Support Equipment Program, about 35 percent of the requested funding, will not permit the development of full Arctic capability for the SSN-21 Class. Specifically this reduction will preclude the necessary steps to harden the structure of the ship and conduct required testing.

The reduction of $4.7 million in Submarine Tactical Warfare Systems (Advanced), about 22 percent of the requested funding, would preclude timely development of critical elements in the submarine hull coatings program essential to meet quieting goals and to reduce the vulnerability of the SSN-21 class to active sonar.

Senator COHEN. Given that we are going to have to reduce your current request by a considerable amount, and given that you are already in negotiations with OSD on where those cuts will be, how do you rank this program in your list of priorities?

Admiral THUNMAN. The New Design SSN is one of the top Navy priorities for fiscal year 1985. This is an essential program for countering the increasingly capable Soviet submarine threat projected for the 1990s and beyond. We have unmistakable evidence that aggressive Soviet technological developments have eroded our technical superiority in sound quieting, sensors and weapons systems. The development plan for the New Design SSN remains focused to bring all program elements to completion in support of a fiscal year 1989 authorization of the lead ship.

Senator COHEN. Does the new design submarine survive any level of cuts that you have worked on?

Admiral THUNMAN. The New Design SSN program does remain as one of the Navy's top priorities, intended to support the goal of lead ship construction in fiscal year 1989. The program elements necessary to focus this development effort are in place and are intended to support the fiscal year 1989 lead ship authorization.

Senator COHEN. Do all the "base" programs upon which much of these funds depend also survive? Given that we may have to cut deeper, is this program still a high enough priority to survive intact?

Admiral THUNMAN. Base R&D programs supporting vital technology improvements in the New Design SSN do remain in place with the intent of achieving a fiscal year 1989 authorization for the lead ship. The New Design SSN feeds on the products of continuing developments in these base programs. The base programs must survive to adequately support the development of a New Design SSN, on budget and on time, which has the currently projected characteristics advances in every area of combat performance. The New Design SSN continues to be one of the Navy's top priorities, with base programs intended to remain in place for lead ship construction in fiscal year 1989.

AEGIS

Senator COHEN. Secretary Paisley, what is your assessment of the anti-air warfare capability of the *Aegis* cruiser, compared to any other guided missile ship in the U.S. Navy?

Mr. PAISLEY. The *Aegis* Guided Missile Ships are more advanced than their predecessors. Each was designed to counter the threat of its time. Our older ships were designed to counter manned aircraft while *Aegis* ships were developed to face the new threat of the cruise missile. Though each system is capable of defeating its intended threat, only *Aegis* provides detection and track information which, when coupled with its quick reaction time, can protect the battle group from cruise missile attacks.

Senator COHEN. Secretary Paisley, how would you describe the Navy's test and evaluation program?

In particular, how would you describe the performance, integrity and rigorousness of OPTEVFOR?

Mr. PAISLEY. Navy's Operational Test and Evaluation Program is sound, efficient, and effective. No new weapon system is approved for production and fleet introduction until the Commander, Navy Operations Test and Evaluation Force (COMOPTEVFOR), has independently evaluated its operational effectiveness and suitability. He makes that determination by testing and evaluating the system in its intended operational environment, in tactically realistic scenarios, and against replicas of the threat which the system will face in service. We also work closely with the newly established Office of the Director, Operational Test and Evaluation, to provide appropriate operational test and evaluation data required by Congress.

With respect to the integrity of COMOPTEVFOR, his independence is assured by the Navy organization structure which keeps him independent of developing agencies, the fleet, and the staffs of CNO and SECNAV. He is under CNO's direct command with no intervening layers and as a result, he reports all operational test and evaluation results directly to the CNO and the Secretary of the Navy.

Senator COHEN. Secretary Paisley, would you comment on the performance of the Navy's operational test program as compared to that of the other services?

Mr. PAISLEY. The Navy's approach to operational testing is unique in that we have one independent test agency, COMOPTEVFOR, and he is extremely successful in that role. I will have to defer to the Office of the Secretary of Defense for a comparison with other services.

Senator COHEN. Secretary Paisley, some people have talked about requiring extensive operational tests for the first ship of a new class before funding construction of any additional ships. What do you think of the proposal?

Mr. PAISLEY. It would not be wise to require extensive operational tests for the first ship of a new class before funding the construction of any additional ships. The reason being the long lead time involved in ship construction. The use of land-based test sites and sea-based test beds allow us to obtain the necessary preliminary operational test information concurrently with lead ship construction.

Senator COHEN. Secretary Paisley, hasn't the Navy followed a prudent risk-reduction program in the case of *Aegis* by building a land-based test site and conducting at-sea tests of *Aegis* on the *North Sound* test ship?

Secretary PAISLEY. Yes. Both developmental and operational testing has been ongoing for some 10 years. As a result, nearly 50,000 hours of system operation ashore and 60,000 hours at sea were concluded before the lead ship, *Ticonderoga*, was commissioned. This was a deliberate, thorough, and highly successful process. The result has been a well designed and thoroughly tested ship, which incorporates the benefits of years of methodical development and testing.

Senator COHEN. Secretary Paisley, isn't this limited degree of concurrency necessary and acceptable due to the rapid pace of technological change in electronics and weapons systems?

Secretary PAISLEY. Yes. The *Aegis* Weapon System was developed to counter an expected threat. The Navy's job was to design and build this system, plus field it in a timely fashion to meet that threat with minimal technical risk. In the case of *Aegis*, concurrency was reduced to a minimum with test firings at sea in *Norton*

Sound being conducted before any production was authorized. The degree of concurrency that was accepted was in the building of computer programs. This was much less concurrency than had been accepted in other successful shipbuilding programs. In order to manage that effort, we adopted the "build a little, test a little" philosophy as our mechanism to control development. The Combat System Engineering Development site at Moorestown, NJ, was built to bring together the computer programs and provide a site to conduct total system integration, evaluation, and testing before their delivery to the ship. We believe *Ticonderoga*'s success at sea is testimony both to the wisdom of our choices and the strength of our management.

Senator COHEN. Secretary Paisley, is it true that David Package approved, some time ago, a policy which encouraged extensive developmental testing, because of such problems as the long construction time for modern weapons?

Secretary PAISLEY. I would defer the answer to this question to the Office of the Secretary of Defense.

Senator COHEN. Secretary Paisley, isn't it true that we can expect to see a continuing competition between anti-ship weapons and ship defenses into the foreseeable future?

Secretary PAISLEY. Senator Cohen, yes. We expect to see qualitative and quantitative improvements in both Soviet and Third World anti-ship weapons. These weapons will continue to be launched by air, surface, and subsurface platforms and will exhibit various profiles, speeds, and guidance systems. At the same time, we are making substantial improvements in our offense-in-depth anti-air warfare systems. We are committed to a counter-platform strategy reinforced by a flexible counter missile capability.

NAVY OPERATIONAL TESTING

Senator COHEN. Mr. Watt, how would you describe the Navy's operational test and evaluation program? In particular, how would you describe the performance, integrity and rigorousness of OPTEVFOR?

Mr. WATT. In general, the Navy has an excellent operational test and evaluation program. The Navy's Operational Test and Evaluation Force is a highly proficient, highly professional organization. OPTEVFOR's insistence on isolating its OPEVAL's from the developing organization usually results in rigorous, objective evaluations.

Of course, one way in which my office is helping to ensure the integrity of the T&E process is to closely monitor testing as it is carried out and to conduct our own independent assessments of test results.

Senator COHEN. Mr. Watt, would you comment on the performance of the Navy's operational test program as compared to that of the other services?

Mr. WATT. The Navy's operational test program compares very favorably to that of the other services. In particular, COMOPTEVFOR does a generally good job of isolating operational testing from undue external influences and assuring the maximum realism in operational testing.

AEGIS TEST SHORTCOMINGS

Senator COHEN. Mr. Watt, have you seen any shortcomings in the Navy's program to test Aegis that have not been identified and are not being addressed vigorously by the service?

Mr. WATT. The principal improvement which Aegis will add to the fleet is its capability for simultaneously handling multiple air threats. At present, however, we do not have the capability for launching and controlling drones in the number required to completely demonstrate this capability. We are now working with the Navy to develop approaches to address this problem.

SHIP TESTING

Senator COHEN. Mr. Watt, would you say it is always necessary to conduct operational tests of the first ship of a class before beginning construction of a second ship of that class?

Mr. WATT. In general, because of the long lead times involved in ship construction, it is not a good practice to require operational testing on the lead ship of a class before beginning construction on the second ship. That is why our current DOD T&E Directive allows some operational testing to be conducted on sea-based or land-based test beds in lieu of an actual ship.

RISK REDUCTION

Senator **Cohen**. Mr. Watt, since Navy warships require about 5 years to build, wouldn't the risk be unacceptable if we had to wait until the end of 5 years for any evaluation of the value and capability of such a ship?

Mr. **Watt**. There are two kinds of risk involved here. If we waited until we obtained a full evaluation of the lead ship of a class before committing to follow-on ships, we would reduce the risk of a bad investment decision. On the other hand, we would increase the risk of not having a needed capability in place at a particular time. Our solution is to allow some early operational testing to be conducted on representative land-based or sea-based test beds, thereby allowing reduction of both kinds of risk.

AEGIS TEST BEDS

Senator **Cohen**. Mr. Watt, hasn't the Navy followed a prudent risk-reduction program in the case of Aegis by building a land-based test site and conducting at-sea tests of Aegis on the *Norton Sound* test ship?

Mr. **Watt**. Yes. The Navy's use of a sea-based and land-based test bed for early Aegis operational testing is an excellent example of the appropriate use of simulation and prototype testing to support subsequent formal operational testing.

CONCURRENCY

Senator **Cohen**. Mr. Watt, isn't this limited degree of concurrency necessary and acceptable due to the rapid pace of technological change in electronics and weapons systems?

Mr. **Watt**. The rapid pace of technological change does argue for rapid deployment of new systems to replace obsolescent older systems. On the other hand, we do not want to deploy systems whose capabilities are unknown or possibly deficient. Our approach to this problem is to do early operational testing on representative test beds in order to demonstrate system capability without unduly delaying fleet deployment. Another consideration in the case of Aegis is that not all its subsystems are entirely new. Some, such as CIWS, have already undergone separate testing and fleet operation.

SHIP DEFENSE

Senator **Cohen**. Mr. Watt, isn't it true that we can expect to see a continuing competition between anti-ship weapons and ship defenses into the foreseeable future?

Mr. **Watt**. Surface ships represent large targets, are relatively slow and relatively expensive. Anti-ship missiles are small, fast, and relatively cheap. It can be assumed that anti-ship missiles will continue to constitute a serious threat to surface ships as long as these apparent advantages persist. However, the capabilities of the ship's own defensive systems, including sensors and weapons, must be considered in any assessment of its vulnerability.

Questions Submitted by Senator Dan Quayle

CONVENTIONAL WEAPONS AND DETERRENCE

Senator **Quayle**. Assuming that it is a nuclear war that we are most anxious to deter, wouldn't our assignment of conventional weapons where possible to tasks currently associated with nuclear weapons work to strengthen deterrence?

Admiral **Thunman**. The goal of our policy is to deter war at all levels of conflict. Assigning conventional instead of nuclear weapons does not strengthen deterrence. Our intelligence offices tell us that Soviet targets are getting harder, and are not suitable for conventional attack. We develop nuclear weapons only where there is no satisfactory conventional capability. We cannot devleop and produce enough conventional weapons to equal the destructive capability of our nuclear weapons. To try to do so would weaken deterrence, not strengthen it.

WEAPON SYSTEM ACCURACY

Senator **Quayle**. Is it Navy policy to make our cruise and submarine launched ballistic missiles as accurate and discriminate as possible?

Admiral Thunman. Yes, it is Navy policy to improve the accuracy of our missile systems where we are able to thereby increase military effectiveness. The policy allows the most efficient and effective use of these weapons. This accuracy provides a de facto discrimination between targets and the surrounding non-military areas.

Senator Quayle. What is the Navy doing to get its cruise and submarine-launched ballistic missiles' inaccuracies down to zero?

Admiral Thunman. Regarding our cruise missiles, present accuracy fulfills all system accuracy requirements. Further accuracy improvements have not been deemed necessary tactically or to be a cost effective measure.

Regarding strategic missiles, we are working to improve the accuracy of our strategic submarine launched ballistic missiles through the deployment of the new Trident II (D-5) missile. This missile will have a significant improvement in accuracy over the present missile systems. Although the accuracy, or miss distance, of the D-5 missile will not be "zero," it will be sufficient to meet its intended military use.

TOMAHAWK

Senator Quayle. Is it Navy policy to extend the range of its current generation of conventionally armed land-attack cruise missiles (the TLAM/C Tomahawk) and to improve their accuracy so that some targets currently assigned to nuclear armed cruise missiles might be targeted by conventionally armed cruise missiles instead?

Admiral Walters. It is Navy policy to improve our weapon systems where necessary to maintain their capability against an increasing threat or where such an improvement will increase military utility and cost effectiveness. The range and accuracy of TLAM/C meets our current requirements for a ship and submarine launched conventional land attack cruise missile. Increased TLAM/C range would give the operational commander more tactical flexibility in launch and targeting. Increased accuracy would not significantly increase the effectiveness of current warheads on most targets.

TLAM/N is usually selected for targets which require a large area or high level of destruction. The TLAM/C warhead, while capable of significant damage against the target set it was designed for, would not generally be suitable for attacking TLAM/N targets even with pinpoint accuracy. The present conventional warhead is not sufficiently destructive to inflict the required damage.

We have initiated preliminary investigation into potential improvements to meet future Tomahawk and advanced crise missile design requirements. Increased range, accurancy and warhead lethality will be addressed.

Senator Quayle. Does the Navy have specific goals for reducing the specific fuel consumption of the existing generation of cruise missiles (BGM-109A, B and Cs)? If so, what are they and when will they be achieved?

Admiral Walters. The Navy's current plan for Tomahawk BGM-109A and BGM 109C is to adopt the Williams uprated engine F107-WR-401 (formerly 14A6) with approximately 40 percent increased thrust and a goal of five percent better specific fuel consumption. The BGM-109B (Anti-Ship) missile will be able to utilize existing engines from the inventory including those freed up by retrofit of the BGM-109A and C with -401 engines. A schedule to accomplish this retrofit plan has been developed and covers 3½ to 4 years including flight test, it utilizes maximum concurrency with an existing Air Force development plan.

Senator Quayle. Does the Navy intend to deploy high density/high energy fuels (advanced hydrocarbon and slurry fuels) for use on the current generation of cruise missiles? If so, by when?

Admiral Walters. To date no development nor testing of high density fuels has taken place for specific application to the Tomahawk family of cruise missiles. Plans have been developed to investigate and test candidate high density fuels for Tomahawk application. Included in those to be considered would be EXOTHTRIC, 5J-5 blends, H-COT DIMER based fuels, and carbon and aluminum slurries. The storage stability, materials compatibility, cost, toxicity, and performance gains have yet to be fully assessed. A program leading to final deployment of this capability would encompass three to five years.

Senator Quayle. Does the Navy have a specific plan for uprating the turbofan engine used in the current generation cruise missile to increase fuel efficiency beyond the planned retrofitting of the F107 engine with the Williams International 14A6 turbofan? What goals has the Navy established for increasing the engine efficiency of the current generation of cruise missiles (give answer in percentage cruise missile range increases that such engine improvements would produce) and when does it project that these goals will be accomplished?

Admiral **Walters**. the Navy at present does not believe that the uprating of the Williams International engine to improve the fuel efficiency beyond that covered in the answers above is reasonable. In 1981 the Defense Science Board met to look at missile engine technology and determined that growing the WI engine beyond the 14A6 program was too great a technical risk and if a new engine became necessary, a development program should be established. We are investigating potential improvements to meet future Tomahawk and advanced cruise missile design requirements. Increased range will be addressed in this investigation.

NAVY DEFENSE

Senator **Quayle**. In the Defense Department's Annual Report to Congress (pages 143-46) DOD emphasizes the importance of our fleet to defend itself against Soviet Air Launched Cruise Missiles (ALCMs) delivered from Soviet land-based aircraft and from Soviet submarines and surface ships. Allowing, as the Report does, that the "best way to counter this threat is to develop systems that can detect and engage Soviet forces before they come within range of launching their missiles," wouldn't it make sense for the Navy to be able to attack Soviet aircraft at their land bases before they took off?

Wouldn't this, in fact, be in the best tradition of the Navy's multi-layered defense in depth concept?

Admiral **Walters**. Attacking Soviet aircraft at their land bases before they take off is a very effective way to suppress and attack and would enhance the survivability of the battlegroup as a whole. Conventional land attack Tomahawk can provide one method of doing this.

TOMAHAWK LAND ATTACK—CONVENTIONAL (TLAM/C) TARGETING

Senator **Quayle**. Earlier in the same report, DOD notes that the Tomahawk cruise missile will "be based aboard large numbers of surface ships and submarines, giving them a capability to strike enemy surface ships and shore targets beyond the horizon."

Yet, in the Report's discussion of its anti-air warfare programs, DOD fails even to list the Tomahawk (except as a possible anti-ship weapon to be placed on the new DDG-51 guided missile destroyer) and instead emphasizes the utility of using land and sea based U.S. aircraft to counter Soviet bombers.

Are U.S. conventionally armed land attack cruise missiles launched from U.S. submarines incapable of threatening Soviet naval aviation based at Cam Ranh Bay, Afghanistan, South Yemen, and the Trans Caucasus?

Admiral **Thunman**. The U.S. conventionally armed land attack cruise missile is still under development. The submarine launched and ship launched versions will be able to range Soviet naval aviation based at Cam Ranh Bay, Southern Afghanistan, South Yemen and in the Trans Caucasus region.

SLCM/ALCM VULNERABILITY

Senator **Quayle**. Would conventionally armed land attack SLCMs launched from U.S. submarines against fixed Soviet naval aviation base targets such as base revetments, taxiways, parking aprons, missile loading and storage facilities, and fuel and munition stores be more vulnerable to Soviet countermeasures than ALCMs launched from carrier based aircraft?

Admiral **Thunman**. There is currently no land attack air launched cruise missile in the U.S. inventory capable of being launched from carrier based aircraft.

There is no difference in detectability between surface launched and submarine launched SLCMs once they leave the launch platform. Since a submarine could be expected to get to a launch area more covertly than a surface ship, this could enhance overall cruise missile survivability.

LARGER CONVENTIONAL LAND ATTACK MISSILE

Senator **Quayle**. The DOD Report (on page 149) describes the development of a new attack nuclear submarine that "will carry more weapons than previous classes" (including the planned SSN-688). Are there any plans now to develop a larger conventionally armed land attack SLCM capable of ranges in the 1,500 mile category for deployment on this more "accommodating" attack submarine?

Admiral **Thunman**. There are no current plans to develop a larger, longer range, submarine launched, conventionally armed, land attack missile. We can logically expect, however, that future weapon development will necessitate some size increase to incorporate greater range, speed, guidance or payload. In this eventuality the

SSN-21 does possess the growth capability to accommodate the introduction of larger sized weapons.

TOMAHAWK

Senator **Quayle**. On March 31, 1984, Chief of Naval Operations, Admiral James D. Watkins, urged the Navy to maintain maximum possible production of cruise missiles and complained about the critical lack of naval missile systems in general ("Admiral Reports Missile Shortage," New York Times, April 1, 1984). In light of the Navy's need for additional missiles as soon as possible, wouldn't it make sense to multiply the effectiveness of the cruise missiles you are acquiring (particularly of the TLAM/C) by increasing their accuracy so that fewer missiles would have to be expended tc assure destruction of a particular target?

Admiral **Walters**. Improving the accuracy of TLAM/C with its current conventional warhead would not appreciably enhance its damage effectiveness against most targets and would provide only a marginal benefit in reducing the expenditure of missiles in combat. Advanced warhead designs coupled with increased accuracy may result in enhanced missile effectiveness against specific target sets. These and other concepts are under investigation as potential missile improvements to meet future Tomahawk and advanced cruise missile design requirements. Our current efforts however, are focused on fleet introduction of Tomahawk. The Navy is concentrating on moving the missile from development to production as soon as practical in order to make this significant force multiplier available to the fleet in numbers sufficient to meet the growing Soviet naval threat.

EARLY WARNING AND SURVEILLANCE

Senator **Quayle**. Besides the acquisition of Aegis (which will not be fully deployed for several years) what are we doing now to attain earlier warning of a possible Soviet launching of an air or sea launched cruise missile against our surface combatants?

Admiral **Walters**. In support of the Navy's offensive AAW strategy, improvments in all areas of early warning and surveillance are ongoing. [Deleted.] Further, improved ASW and airborne surface surveillance sensors will provide indications, warning and surveillance necessary to counter both the launch platform and antiship cruise missiles launched from surface and subsurface threats. These initiatives, along with the Aegis combat systems will provide the requisite wide area and close-in surveillance necessary to posture Battle Force AAW defenses and counter heavy air attacks.

E-2C

Senator **Quayle**. Has the Navy considered additional buys of carrier-based E-2C aircraft and extending their range?

Admiral **Walters**. The Navy's stated objective is to procure 100 E-2C aircraft in order to achieve an all E-2C force by 1988. This will provide E-2C's for 14 fleet squadrons, two training squadrons, and the Navy's two reserve E-2 squadrons. A recently completed Air Wing Composition Study recommends an expansion of the present four-plane E-2C squadron to five planes. The procurement implications of this study are now being investigated. Planned improvements to the E-2C weapon system and engine will significantly increase operational as well as detection range by 1989.

Senator **Quayle**. Could the Japanese help supply us with earlier warning by purchasing E-2C's and AWACS and sharing warning information with our Pacific Fleet? Has the Navy suggested this idea to the State Department or to the Japanese?

Admiral **Walters**. The Japanese have purchased eight E-2C's for use by the Japan Air Self-Defense Force (JASDF). Four aircraft have been delivered and four will be delivered during the next year. Most combined U.S./Japanese exercises, particularly those in the Sea of Japan, employ the U.S.S. *Midway* Battle Group as the primary participant. The E-2C will be introduced into the *Midway* air wing during fiscal year 1985. This parallel introduction of the E-2C is seen by CINCPACFLT as a key to greater integration of USN/JASDF capabilities and significant improvement in USN/JASDF interoperability.

QUESTIONS SUBMITTED BY SENATOR JOHN P. EAST

MK 48 TORPEDO

Senator **EAST**. Would you please outline the new Soviet submarine threat and its impact on our sub versus sub tactics? How are we going to fight these deeper diving faster submarines?

Admiral **THUNMAN**. In addition to their advantages in speed and depth capabilities, the new Soviet submarines currently under construction are significantly quieter, [deleted]. These improvements make them [deleted]. These Soviet improvements, if not addressed through concurrent improvements in our own submarine fleet, will inevitably result in continued deterioration of our tactical advantages over the Soviet submarine force.

To fight these improved submarines we require quieter submarines with improved sensors and substantially more firepower. The SSN-21 class has been designed to provide the required tactical capabilities to engage the much more formidable Soviet submarine designs which we see entering their fleet in the 1990's.

Clearly we will also need a highly effective weapon in future engagements. The MK 48 ADCAP torpedo under development will possess the qualities to attack and destroy the most capable Soviet submarines of the future. [Deleted.]

With respect to faster, deeper diving Soviet submarines, the threat must be kept in perspective while not being underestimated. Today only about [deleted] of their submarine force is capable of significantly higher speeds and deeper depths than our submarines. We do not anticipate that this percentage will significantly change in the future. Even against these faster and deeper diving submarines, however, our weapons provide an effective counter. [Deleted.] As a result, we feel that control of the tactical environment through improved sensors and weapons will offset any gains in speed and depth capability of a relatively small proportion of the Soviet submarine fleet.

Senator **EAST**. Will these new tactics require additional numbers of weapons? Does the Navy have a sufficient number of torpedoes in the inventory to combat this latest threat?

Admiral **THUNMAN**. Our tactics against the more capable Soviet submarines will require the expenditure of more torpedoes for every engagement. Logically this would indicate that our current inventory will not provide the required number of torpedoes to engage the improving Soviet submarine force. Our most recent analysis shows a requirement for [deleted] MK 48 torpedoes in 1984. We have [deleted] torpedoes in inventory. [Deleted.]

Senator **EAST**. How many shipfills (Basic loads) of torpedoes do we have in our inventory?

Admiral **THUNMAN**. Today's total of [deleted] torpedoes in the fleet will provide approximately [deleted] combatant shipfills.

QUESTIONS SUBMITTED BY SENATOR PETE WILSON

BB MISSOURI REACTIVATION

Senator **WILSON**. Admiral Walters, during your testimony you stated that you are exploring the possibility of funding the entire *Missouri* reactivation with fiscal year 1984 funds. Where are the savings coming from?

Admiral **WALTERS**. Assets are available within the fiscal year 1983 CVN program to fully fund a fiscal year 1984 reactivation of the *Missouri*. The assets in the fiscal year 1983 CVN program result from savings in government furnished equipment lines and reduced escalation requirements.

The fiscal year 1985 Budget requested $422.6 million for the *Missouri*. The new requirement for the *Missouri* in fiscal year 1984 is $336.2 million and is derived as follows:

	Million
End Cost-fiscal year 1985 President's Budget	$480.3
Less:	
Fiscal year 1984 advance Procurement previously appropriated	−57.7
Fiscal year 1985 Full Funding Request	422.6
Fiscal year 1984 Adv. Proc. Reprogramming	−73.4
End cost savings (due to lower inflation if BB is fully funded in fiscal year 1984	−13.0
Net Requirement	336.2

Because the CVN asset is in an earlier fiscal year (fiscal year 1983), Congressional action will be required to transfer the asset to fiscal year 1984 as a financing adjustment to the fiscal year 1984. Supplemental Appropriation, thus funding the *Missouri* in fiscal year 1984.

WEST COAST MARITIME CAPABILITY

Senator Wilson. Admiral Fowler, you mentioned a healthy competitive base for shipbuilding and ship repair in fiscal year 1984. I agree we made a good start last year in reviving our endangered West Coast capability, but fiscal year 1984 was only a start.

What do you foresee in fiscal year 1985 for our West Coast yards? I am thinking especially of the following:

(1) Home-porting of the *Nimitz* carrier battlegroup;

(2) *Spruance* class overhauls originally scheduled to be accomplished at Long Beach and now scheduled for Pearl Harbor;

(3) The FFG for fiscal year 1984 you stated has yet to be awarded. Could you comment on this and on the general proposition of the strategic requirement to maintain a healthy West Coast maritime capability?

Admiral Fowler. During fiscal year 1983, 23 of the 53 private shipyards involved in Navy ship repair and new construction work were on the west coast. We cannot provide total figures for fiscal year 1984 since all the contracts have not yet been awarded; however, the Navy does not foresee any radical fluctuations in its overall requirements for industrial resources in the near future.

The Navy's ship overhaul planning for fiscal year 1985 calls for 11 ships to be overhauled in the three West Coast Naval Shipyards and 12 ships in the west coast private sector.

Regarding the two *Spruance* class overhauls, these ships were rescheduled from Long Beach Naval Shipyard for accomplishment at Pearl Harbor Naval Shipyard.

The homeporting of an aircraft carrier battle group in Puget Sound will result in additional ship repair work in that area, but that work will not materialize until after fiscal year 1985.

With respect to the FFG in fiscal year 1984, options to the fiscal year 1981 contracts with Bath Iron Works and Todd Los Angeles for an additional FFG have been extended until 30 June 1984. The fiscal year 1984 FFG will be awarded by exercising one of these options. The award is pending a decision on the configuration of the MK 92 Fire Control system to be installed in the ship. I expect that east and west coast production capabilities in the interest of national defense will be considered in the award of this ship as in the past.

AEGIS TESTING

Senator Wilson. Admiral Walters, should the Congress approve your request for funding for the lead DDG 51?

Admiral Walters. Yes. The Navy needs destroyers to replace retiring DDG 2 and DDG 37 class ships. This replacement destroyer was designed under the philosophy that the Navy must incorporate state-of-the art, multi-mission combat capability into a ship that is affordable. DDG 51 is that ship. We need it, and we need it now.

Senator Wilson. Is it your intention to include criteria in the RFP recognizing the need for maintaining a dispersed maritime industrial capability? Didn't you use criteria like this in an RFP for a submarine?

Admiral Walters. There is nothing in the RFP which addresses industrial dispersal, however, our current acquisition strategy provides for at least two shipbuilders, which will insure dispersal. Inclusion of dispersed capability was included in a submarine RFP to preclude construction of the class at one shipyard.

RACER

Senator Wilson. Admiral Walters, what are the Navy's estimated fuel savings for RACER when installed in DDG-51 class ships?

Admiral Walters. The annual fuel savings is estimated at 27,600 barrels per ship. This equates to $2.8 million (dollars fiscal year 1983) annually per ship.

Senator Wilson. Admiral Walters, what are Navy's estimates for and backfit costs for RACER on DDG-51 and other ships in first flight?

Admiral Walters. We have not done any detailed cost estimates for the backfit of RACER on DDG-51, but we estimate that it would cost about 25 percent more for a backfit than a forward fit. The current estimate for a forward fit is $9.5 million (dollars fiscal year 1983).

Senator **Wilson**. What are the Navy's goals for energy efficiency in the DDG-51?

Admiral **Walters**. The initial goal for energy efficiency in the DDG-51 class was for a 35 percent reduction in energy consumption as compared to CG-47, adjusted for differences in ship size.

Senator **Wilson**. At what point does the Navy plan to install RACER in DD-963?

Admiral **Walters**. The Navy has no plans to install RACER in the DD-963 class ships.

Questions Submitted by Senator Gordon J. Humphrey

Senator **Humphrey**. Secretary Paisley, would you provide a list of the alternative weapon systems considered for the standoff anti-submarine role, along with a matrix of capabilities, schedules, and costs of each one?

Secretary **Paisley**. The matrix is attached herewith.

VLA

Senator **Humphrey**. Secretary Paisley, what is the Navy planning for a vertical launch anti-submarine weapon in fiscal year 1985 and in the outyears?

Secretary **Paisley**. The Navy plan is to develop a separate and unique weapon system for surface ships and submarines. The shipboard system will be a vertically launched mid range extension of the present ASROC while the submarine system will be a vertically launched canister encapsulated long range weapon system.

Senator **Humphrey**. Secretary Paisley, if the answer to the above question is "the Navy is studying alternative weapons—including a common weapon", then please provide:

(A) What is different from the situation now and that earlier when a common standoff weapon was examined and discarded?

(B) Why did the Navy pursue a competitive acquisition and select a support contractor if the issue of separate versus common weapon had not been examined and resolved?

Secretary **Paisley**. The Navy previously studied alternative weapons and selected separate since surface and submarine programs. The Navy is not studying a common weapon.

Senator **Humphrey**. Secretary Paisley, if a vertical launch anti-submarine weapon is not pursued according to the current Navy plans, what are the consequences in the following areas:

(A) Schedule, to include when will it be completed, both RDT&E and deployment?

(B) Anti-submarine warfare capability of the ships programmed for a vertical launch capability?

(C) Costs?

Secretary **Paisley**. Separate surface and submarine vertical launched anti-submarine weapons are under development.

Senator **Humphrey**. Secretary Paisley, would the selection and deployment of a "common" weapon dilute the standoff role of the LAMPS III helicopter?

Secretary **Paisley**. A common system is not being developed. As stated, separate systems are planned for ships and submarines. Additionally, the surface launched system is a medium range system for use at closer ranges than the first convergence zone. As such, it will not compete with the LAMPS MK III.

Senator **Humphrey**. Secretary Paisley, when you evaluate the cost of alternative weapon systems, do you consider the development and production cost implications of the various systems? Do you also consider the cost and time impacts of changing between concepts (e.g. separate versus common) in making the weapon analyses?

Secretary **Paisley**. Yes. In fact, within the last 6 months we did reexamine a number of alternatives and all of these criteria were considered.

Questions Submitted by Senator Gary Hart

AEGIS TESTING

Senator **Hart**. In the operational tests that occurred in April and September (not including any developmental tests). Did any of the successful firings involve the presentation of more than one target, either simultaneously or in succession?

Admiral **Walters**. Yes, twice and both were in April 1983. In the first, three drones simulated a multiple missile attack in chaff and standoff jamming. [Deleted.]

Two of the targets (BQM-34E and BQM-34S) were engaged and in both cases the AEGIS system performance was graded a "success". [Deleted.]

In the second scenario, three targets were engaged amid chaff, standoff jamming, and self-screening jamming. [Deleted.]

Senator **Hart**. Did any of the successful firings involve firing more than one missile at the same target?

Admiral **Walters**. Yes, on a number of occasions.

Senator **Hart**. In the April operational tests, how many targets were presented flying at altitudes [deleted]? Of these, how many were hit?

Admiral **Walters**. Two targets were presented flying [deleted]. None of these were killed. [Deleted.]

Senator **Hart**. In the April operational tests, how many targets were presented flying at or below an altitude of 30 feet?

Admiral **Walters**. The exact altitude of targets is difficult to ascertain when flying so low. [Deleted.]

Senator **Hart**. In the April operational tests, how often were multiple targets presented [deleted].

Admiral **Walters**. One multiple target raid was flown in April 1983, which included [deleted] target flying [deleted]. There were no multiple target raids with more than one target at low altitude.

Senator **Hart**. Why were fewer targets presented in the October operational tests than in the April tests?

Admiral **Walters**. The number of targets presented was the decision solely of the Commander, Operational Test and Evaluation Force, Real Admiral Carter.

Senator **Hart**. How many of the targets presented in the September operational tests were flying [deleted]?

Admiral **Walters**. [Deleted] targets were presented in September flying at less than [deleted]. [Deleted] were flying at less than 30 feet.

Senator **Hart**. Would you please present the results of each documented live firing pass in the operational tests to date?

Admiral **Walters**. As documented in the OPEVAL report, the test results are:

[See chart on following page.]

Senator **Hart**. Please provide the target detection range for each real pass in at-sea operational testing conditions.

Admiral **Walters**. [Deleted] targets [deleted] were detected and placed into track in time to permit engagement with more than one missile. In some runs, SPY-1A was artificially kept in radar silence until the target arrived at some pre-determined range. Another complicating feature of almost all target scenarios was intense electronic jamming and chaff. Further, low altitude targets are radar horizon limited. It is technically impossible to detect low altitude targets until they are above the radar horizon. Without information on all conditions pertaining to the tests, data on radar detection range can be misleading. Even under these very difficult conditions target detections [deleted].

Senator **Hart**. Which, if any, firings were on a no-notice basis (i.e., no notice was given to the Aegis ship of when and from where the target would be fired)?

Admiral **Walters**. All firings were on a no-notice basis.

Senator **Hart**. How many firings were disallowed, i.e., regarded as a "no test", during the operational tests, and of these, in how many did the missile fired by the Aegis ship hit the target?

Admiral **Walters**. There was one "no test". No missile was fired.

Senator **Hart**. In terms of percentage of days during an average year, how often do ducting conditions occur in the Mediterranean, the Persian Gulf and the Caribbean?

Admiral **Walters**. Statistic data on ducting, where available, is for X-band propagation and extrapolation to S-band is difficult. Ducting based on measurements of the refractivity index at X-band occurs [deleted] in Mediterranean waters and [deleted] in the Caribbean. Published reports readily available do not summarize data for the Persian Gulf. These translate to [deleted] the time for S-band propagation.

If measured by the percent of time that radar range is enhanced by a factor [deleted] at low altitude, ducting at S-band occurs between [deleted] of the time in Carribean waters.

Senator **Hart**. When will you conduct live-firing operational tests in ducting conditions?

Admiral **Walters**. Since ducting is a natural phenomenon, it is difficult to predict its occurrence and impossible to long-term schedule tests for. However, ducting conditions have already existed during the number of operational tests. It should be understood that ducting is not a significant factor in testing Aegis. Ducting enhances Aegis performance and non-ducting conditions are the more stringent environment.

Senator HART. How many targets will be presented in the next operational tests. How many will be below 30 feet in altitude?

Admiral WALTERS. We do not know. These details are known only by the Commander, Operational Test and Evaluation Force until the test is actually conducted.

OT-IIIB MISSILE FIRINGS

OT firing	Event No.	Type target	Target speed	Tactics	Aspect	Environment	MSL	Fire position	Int position	Miss distance	MSL per	Ship perf	Effect	Comment
OT-F1	OT-1	AQM-37C	[Deleted.]											
OT-F2	OT-1	AQM-37C												
OT-F3	OT-1	AQM-37C												
OT-F4	OT-7	BQM-34E												
OT-F5	OT-9	BQM-34S												
OT-F6	NA	False												
OT-F7	OT-9	BQM-34S												
OT-F8	OT-11	Harpoon												
OT-F9	OT-11	Harpoon												
OT-F10	OT-8	BQM-34S												
OT-F11	OT-4	AQM-37C												
OT-F12	OT-8	BQM-34S												
OT-F13	OT-8	BQM-34S												
OT-F14	OT-8	BQM-34S												
OT-F15	OT-6	BQM-35E												
OT-F16	OT-6	BQM-34E												
OT-F17	OT-12	BQM-34S												
	OT-15	BQM-34S												
	OT-16	AQM-37C												
	OT-17	BQM-34S												
OT-F18	OT-19	BQM-34T												
OT-F19	OT-22	AQM-37C												

QUESTIONS SUBMITTED BY SENATOR SAM NUNN

AEGIS TESTING

Senator NUNN. Admiral Walters, what is the rationale for committing to the DDG 51, the new class of surface destroyers, this year?

Admiral WALTERS. Relative to the acquisition process, we are currently finishing contract design. Draft Request for Proposals (RFP's) have been sent to interested shipyards for review. Issuance of the formal RFP is expected in July 1984. These milestones lead to award of the detail design and construction contract for *Arleigh Burke* (the first DDG 51) in December 1984. All this leads to commissioning in July 1989. Any slippage in our overall 29 ship schedule will jeopardize our ability to control the vital sea lanes in the 1990's.

DDG 51

Senator NUNN. Has the Navy looked into extending the life of the destroyers the DDG-51 will replace for several years?

Admiral WALTERS. Yes, we have reviewed this option.

Senator NUNN. How much would this cost and why can't this be done?

Given the budget problems, why do we need to start a new destroyer this year?

Admiral WALTERS. Extending the service life of the older guided missile destroyers is not a cost effective option because these ships have become so manpower and maintenance intensive and their combat systems are growing so obsolescent that they are no longer effective against the threat. This is the compelling reason for DDG 51 now. DDG 51 class destroyers best satisfy Navy's requirement for a surface combatant to replace those aging assets which begin to retire in this decade. Lead ship authorization for DDG 51 in fiscal year 1985 is critical not only to maintain combatant force levels, but also to provide the required combat capability against the expanding threat of the 1990s and beyond. Delaying construction of *Arleigh Burke* class destroyers would have several serious repercussions for the Navy: Force level impact becomes more severe with each year of delay. Force warfighting capability would be seriously affected because increased battle group flexibility, distributive offense, firepower volume and survivability provided by DDG 51 would not be achieved. Battle group composition attaining the balanced warfighting capability required against the three-dimensional threat would be deferred, and would necessitate the continued use of less capable frigates in the battle group; a mission for which they are more not designed.

AEGIS TESTING

Senator **Nunn**. In the recently submitted SAR (Selected Acquisition Report) the Navy shows the DDG 51 to be a 14 ship program for $13.7 billion. However, the Navy has supplied documents to my staff showing the DDG 51 to be a 29 ship program for $21 billion in fiscal year 1983 dollars. What is the current Navy estimate of ships and the cost?

Admiral **Walters**. Both are correct. The Selected Acquisition Report (SAR) presents the President's Five Year Defense Plan (FYDP), in then year dollars, which covers fiscal years 1985 through 1989. The Navy's current extended plan calls for 29 ships to be authorized through fiscal year-1992.

Senator **Nunn**. Why isn't the total program reflected in the SAR?

Admiral **Walters**. The SAR is administratively formatted to show the current Five Year Defense Plan which relates to the President's Budget before the Congress.

Senator **Nunn**. What is the then-year dollar cost of the DDG 51 and what is the Navy's estimated life cycle operating cost of this program?

Admiral **Walters**. *Arleigh Burke* (DDG 51) is budgeted at $1,252 million in fiscal year-1985 dollars. The life cycle operating cost is computed based on a 30 year operating profile for the entire class and then averaged to represent the average annual life cycle cost. In fiscal year 1983 dollars, the estimate is approximately $37 million. In then-year dollars, this equates to approximately $110 million. While this figure represents all expected direct and indirect costs, including personnel, supplies, fuel, repair parts, maintenance and depot services, it should be readily obvious that its magnitude is driven by economic assumptions on the national rate of inflation.

Senator **Nunn**. I understand that the Navy estimates that the cost of the lead DDG 51 is roughly $1.2 billion and that the follow-on cost is expected to be roughly $700 million per ship.

Admiral **Walters**. Yes, but in different year dollars. *Arleigh Burke* is budgeted at $1.252 billion in fiscal year-1985 dollars, while the follow ship estimate represents the average cost of ships 6 through 10 in fiscal year-1983 dollars. Through the many reviews conducted on DDG 51 cost estimates, a common base for reviewing cost was determined to be fiscal year 1983 dollars. The chart below may help you better understand the various estimates.

	Fiscal year—				
	1985	1986	1987	1988	1989
Quantity	(1)	(0)	(3)	(5)	(5)
Average end cost (then year dollars)	1,250		980	910	940
Average end cost (fiscal year 1983 dollars)	1,100		780	690	680
Average ships 6–10 (fiscal year 1983 dollars)				690	690

Senator **Nunn**. Is the $700 million cost per ship starting with ship number two, or when does the ship reach that cost level?

Admiral **Walters**. The $700 million estimate refers to the average cost of ships 6 through 10 in fiscal year-1983 dollars. This level is not attainable until fiscal year 1988.

Senator **Nunn**. What happens to the cost of the ship if the Navy determines, for instance, to add some missile capability, or to add some ASW capability such as a helicopter hangar or other capability to deal with the threat in the mid-90's timeframe when this ship really comes into the fleet in large numbers?

Admiral **Walters**. DDG 51 was designed to defeat the projected threat and the threat as we know it today. Included in our design philosophy are sufficient margins to accommodate future change or to substitute combat capability as necessary.

Senator **Nunn**. Don't the cost comparisons between the CG 47 cruiser and the DDG 51 become closer if the Navy does not meet the cost estimates of the DDG 51 or decides to add capability to the DDG 51?

Admiral **Walters**. Yes, it is possible, but not probable. Since OG's are being built today, we were able to prepare our cost estimates for DDG 51 with accurate return cost data from CG 47 (as well as the FFG 7, DD 963 and DDG 993). We are therefore very confident that our estimate for *Arleigh Burke* is accurate, and that we will be able to build her within budget. She has always been designed with capability as the number one priority, so we do not foresee major capability changes in the near future. With these two items in mind, we do not believe the comparisons will become closer.

SURFACE SHIP IMPROVEMENTS

Senator **Nunn**. How many surface ships has the Navy had to improve or add capability to in recent history?

Admiral **Walters**. All ship classes and individual hulls are continually undergoing planned modernization under the Fleet Modernization Program (FMP). Improvements vary from class to class but the basic philosophy is to perform reliability and maintainability improvements where cost feasible and to improve combat systems to meet the threat, again where cost feasible. Navy ships are designed with sufficient space and weight available to allow these modernizations in anticipation of changing requirements from real world national commitments.

AEGIS TESTING

Senator **Nunn**. Isn't it logical to assume that the Navy will decide to add capability at some point to the DDG 51?

Admiral **Walters**. Yes, but not in the near future. Our design has always focused on multi-mission capability at an affordable price. For this reason, we believe she is well suited to fulfill her mission requirements. She has not been, like some ships, deliberately underarmed in any major sense in order to hold costs. However, in the future, changes may be necessary to maintain our edge against the expected threat. In that case, there are sufficient margins designed to allow expansion and change-out of various weapons systems. These margins are included in all ship designs to allow us to attain necessary life expectancies.

DDG 51

Senator **Nunn**. The DDG 51 five-year shipbuilding program is expected to include one in fiscal year 1985, three in fiscal year 1987, five in fiscal year 1988 and five in fiscal year 1989, for a total of 14 ships. What happens to the cost of each ship if the rate of three, then five, and five is not achieved or authorized?

Admiral **Walters**. The estimated cost of the present DDG 51 five-year shipbuilding program, which includes 14 ships between fiscal year 1985 and fiscal year 1989, is based on that particular building profile, and changes, either increases or decreases, to the profile will cause the estimated cost for individual fiscal year programs to change. The DDG 51 cost estimates assume a two shipyard acquisition strategy wherein keen competition is anticipated. A ship's cost estimate is derived from a myriad of contributing program factors, the majority of which are sensitive to the number of ships in any given year. Some of these quantity related items include construction materials, combat system equipments, propulsion and electrical equipments, and class systems engineering shared by all ships of the class. Also, the combat system costs are based on quantity buys which include a favorable impact of acquiring three CG 47 cruisers per year in fiscal year 1985 through fiscal year 1987 and two per year in fiscal year 1988 and fiscal year 1989. A large number of the combat system components are the same or very similar between these 2 shiptypes. Reductions to the quantities of DDG 51's would have an adverse effect on the competition expected among shipyards with respect to the follow-on ships and the price of combat system equipments would increase as well. Thus, any alteration in yearly quantity will necessitate a recalculation of each ship in the entire program.

Senator **Nunn**. How many per year are essential to preserve the Navy's estimate of $800 million per ship?

Admiral **Walters**. The Navy's estimate for the average follow ships 6 through 10 is $700 million in fiscal year 1983 dollars. In order to attain the Navy's estimate of

$700 million, the shipbuilding program profile must remain the same as that upon which the cost estimate was based, i.e., one in fiscal year 1985, three in fiscal year 1987, five in fiscal year 1988, and five in fiscal year 1989. Lesser quantities would cause the costs of these ships to increase because of the negative impact on shipyard competition and combat systems quantity buys. Although not specifically costed at this time, it is certain that any reduction in the number of DDG 51's or CG 47's would cause the DDG 51 average 6 through 10 cost to increase.

Senator NUNN. Norman Polmar last week testified that he felt the DDG 51 design suffered from a lack of enough missiles, organic helicopter ASW, and several other criticisms. How do you respond to these criticisms?

Admiral WALTERS. The DDG 51 combat system design is optimized for the multimission role it must serve. She is far more capable than the ships she will replace (DDG 2 and DDG 37 class ships), but somewhat less capable than CG 47, which includes a larger loadout of weapons and a somewhat more capable combat systems suite. DDG 51 capability matches her mission requirements.

100 ATTACK SUBMARINES

Senator NUNN. Admiral Thunman, the Navy has always stressed the need for attack submarine capability and the minimum number needed of 100.

Has the Navy looked into more than 100 submarines and why did you decide on only a force of 100?

Admiral THUNMAN. The JCS have determined that a force of [deleted] SSNs is necessary to conduct all expected wartime missions with a [deleted] assurance of success. The Navy's fiscally constrained goal continues to be 100 anti-mission, nuclear attack submarines.

FORCE COMPOSITION

Senator NUNN. Has the Navy looked into perhaps buying more submarines and not as many new surface combatants?

Admiral THUNMAN. To accomplish the Navy mission in support of the national strategy requires a balance of forces. To build more submarines and fewer surface combatants would reduce the Navy's capability to accomplish those missions unique to surface combatants.

WHY 15 CARRIER BATTLE GROUPS?

Senator NUNN. Admiral Walters, Senator Stevens, Chairman of the Defense Appropriations Subcommittee, suggested to Navy witnesses last week that perhaps the Navy should consider building only to 14 carrier battle groups with escorts due to budgetary constraints. What is the Navy response to such a suggestion?

Admiral WALTERS. Our country's National Security Policy dictates that we, as a nation, recognize our world-wide commitments to counter what has emerged as a global threat. The United States has entered into some 40 treaty commitments which, with the realities of growing interdependence (for example, the increase in energy dependency), bind our fortunes and those of our allies to all of the world's oceans. That, coupled with the growth of Soviet global naval capabilities dictates a U.S. maritime strategy that protects these commitments in the face of this growing threat. Our present national strategy relies heavily upon military forces deployed overseas—forces capable of responding to a spectrum of contingencies in overseas areas of primary national interest. These forward deployed forces, which must be supplied by sea, provide this country with flexible and rapid response to whatever pressures our potential enemies may apply. It is imperative that our Navy keep open sea lines of communication permitting maintenance of a credible U.S. forward deployed posture on land areas abroad in support of treaty commitments. This can only be done if our Navy can gain and maintain continued control of the seas, and the air over the seas, as required in support of our national security policy. The aircraft carrier battle group (CVBG) is the cornerstone of our sea control mission, possessing the full spectrum of capabilities necessary to defeat our potential enemies at sea.

Specific force requirements are derived from analyses of the Navy's mission and careful appraisal of the fleet's ability to perform these missions in the face of potential opposition. They include recommendations from the unified, specified, and fleet commanders around the world. The inputs, progress, and conclusion of this process are reviewed in depth by the CNO and the Navy Secretariat before they are forwarded to the JCS, the Secretary of Defense, the President, and the Congress.

Thus, carrier force levels are recommended from assessments of the carriers' contribution to the national objectives in interaction with other naval and military forces. Force levels in being reflect judgments of political, military, and economic risks involved in meeting force level requirements to support national objectives.

The national requirement for CVBG's at a prudent level of risk as synthesized by numerous Joint and Service studies and analyses and war gaming results, is a classified number; but it is a number significantly greater than the Navy's current program objective of fifteen, the absolute minimum number of CVBG's necessary to carry out the maritime strategy both in terms of meeting peacetime deployment commitments and assuring reasonable confidence of success in wartime.

Reducing the Navy's program objective to 14 CVBG's would have a deleterious effect in both peacetime and wartime roles. To maintain our current peacetime deployment commitment with a reduced force, would place further strain on an operating tempo that is already higher than at any time since World War II. The effect this additional strain would place on personnel retention (a key ingredient in fleet readiness) is obvious. A less obvious but potentially far more costly effect in wartime would be the reduced level of assurance of success our Navy would face.

REAL GROWTH

Senator **NUNN**. What real growth in the Navy budget will it take for the next five years to meet the Navy's shipbuilding program and the 600 ship Navy?

Admiral **WALTERS**. The average real growth in the 5 year SCN plan fiscal year 1985–fiscal year 1989) is 8.5 percent.

DESTROYER EXTENSIONS

Senator **NUNN**. How much would it cost to extend the service of some of the current destroyers the Navy will replace with the DDG 51s?

Admiral **WALTERS**. The Navy has reviewed the option of extending service life of the older guided missile destroyers and determined that extensions are not cost effective. These ships have become so manpower and maintenance intensive and their combat systems are growing so obsolescent that they are no longer effective against the threat.

Senator **NUNN**. How much would it cost to keep the destroyers the Navy plans to replace when the first DDG 51 enters the fleet in roughly 1989–90?

Admiral **WALTERS**. U.S.S. *Charles F. Adams* (DDG 2) is the first ship scheduled to retire that will be replaced by DDG 51. As I previously mentioned, the obsolete combat system and the fact that this class of ship is extremely manpower and maintenance intensive have driven the decision not to extend service life because it is not cost effective to do so. These ships cannot be further modernized to make them effective against the expanding threat of the 1990s because they have already grown to their maximum space and weight limitations without exceeding vital stability criteria.

Senator **NUNN**. How many of the current destroyers will reach obsolescence in 1989, 1990, 1991, through 1993? Why can't the service life of these ships be extended similar to what the Navy has done with other ships?

Admiral **WALTERS**. For force level planning purposes, Navy uses a notional 30-year service life for all surface combatant ships (cruisers, destroyers, frigates). Since the DDG 2 and DDG 37 class ships were commissioned between 1959 and 1964 their projected service life would carry them to the 1989 to 1994 time frame. A total of 20 DDG 2 and 9 DDG 37 class ships will be retired when they reach the 30-year point because their combat capability will be obsolescent and there is no growth potential for the hulls to be modernized to the degree required for warfighting in the mid to late nineties and beyond.

QUESTIONS SUBMITTED BY SENATOR JOHN C. STENNIS

AEGIS

Senator **STENNIS**. How does Russian Testing of ship air defense systems compare with testing done for Aegis to date? Do the Russians monitor Aegis testing?

Admiral **WALTERS**. [Deleted.] The Soviets do observe Aegis testing and have had intelligence gathering vessels in the vicinity of testing on several occasions.

AEGIS TESTING

Senator **Stennis**. Where are we on the Aegis testing learning curve? In other words, how much additional information is to be gained from testing, out of the total amount available?

Admiral **Walters**. We are near the end of the testing learning curve on the current system. We have proven that the total system works as designed, and that it works at sea. Sub-system tests have proven high performance and reliability. All levels of the system have been extensively tested in stressing environments. Our failures have been minor in nature and relatively inexpensive to repair. Recent fixes have been only low level computer program modifications and minor revisions to the training procedures. No problem exists, that we know of, which would require any significant shift in the program. Additional testing will be required in the future for SPY-1B/D, SM-2 Block II missile and the Vertical Launch System.

Senator **Stennis**. What is the total cost of all testing of the Aegis ship/system during operational testing? During developmental testing?

Admiral **Walters**. Total Aegis testing has cost approximately $.5 billion for both developmental and operational testing.

Senator **Stennis**. What is the cost of each type target and what are its characteristics? How many of each type target have been used in testing Aegis to date?

Admiral **Walters**. [Deleted.]

The number of target presentations at Aegis and cost for each in fiscal year 1983 dollars follow: AQM-37C has been flown [deleted] times at $50,000 each, the AQM-37A has been flown [deleted] times at a cost of $110,000 each, the BQM-34E/T has been flown [deleted] times costing $800,000 each, the CQM-10B has been flown [deleted] at a cost of $150,000 each, the HAST has been flown [deleted] at a cost of $150,000 each, the LAST (Talos) has been flown [deleted] at a cost of $100,000 each, the MQM-8G (Vandal/Buzzrd) [deleted] times at a cost of $170,000 each, the MQM-74C [deleted] and costs $120,000, the BQM-34A/S [deleted] times at a cost of $400,000 each, the QF-86 [deleted] times at a cost of $500,000 each, the Harpoon [deleted] at $750,000 and finally the QT-33 [deleted] at $500,000. Total target cost approaches $50 million.

Senator **Cohen**. Gentlemen, I want to thank you all very much for being here with us today.

This hearing is adjourned.

[Whereupon, at 12:17 p.m., the subcommittee adjourned, to reconvene upon the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

WEDNESDAY, APRIL 11, 1984

U.S. SENATE,
SUBCOMMITTEE ON SEA POWER AND FORCE PROJECTION,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NAVY PROCUREMENT AND RESEARCH AND DEVELOPMENT

The subcommittee met in open session at 2:51 p.m., in room SR-232A, Russell Senate Office Building, Senator William S. Cohen (chairman) presiding.

Member present: William S. Cohen.

Staff present: L. Wayne Arny III and Mark B. Robinson, professional staff members and Kathleen L. McGuire, staff assistant.

Also present: Dale F. Gerry, assistant to Senator Cohen; Francis J. Sullivan, assistant to Senator Stennis; William S. Lind, assistant to Senator Hart; and James Steinberg, assistant to Senator Kennedy.

OPENING STATEMENT OF SENATOR WILLIAM S. COHEN, CHAIRMAN

Senator COHEN. The hearing will come to order.

At this hearing, we will continue to receive testimony on Aegis testing, the DDG-51, and the new design submarine. We did not have sufficient time at two earlier subcommittee hearings to get into closed session and to receive classified testimony on these programs.

Today, we will also receive testimony on the Navy's request to reprogram funds for the purpose of accelerating the reactivation of the third battleship.

I am happy to extend a warm welcome to all our witnesses here today: The Honorable Mel Paisley, Assistant Secretary of the Navy for Research, Engineering and Science; Mr. Charles Watt, Acting Director of the Defense Test and Evaluation Office; Vice Adm. Al Baciocco, Director of the Navy's Office of Research, Development, Test and Evaluation; Vice Adm. Bob Walters, Deputy Chief of Naval Operations and Surface Warfare; Vice Adm. Ron Thunman, Deputy Chief of Naval Operations for Submarine Warfare; and Capt. Jack Donegan, the Aegis project combat system engineer.

Since this hearing is a continuation of our earlier hearings, I will keep my remarks brief. At the appropriate time, we will move into executive session for discussion of classified material.

During the open session, we will talk about Aegis testing. Mr. Watt will speak first, followed by the Navy's witnesses, Admiral Walters and Captain Donegan. They will be accompanied by Mr. Paisley and Admiral Baciocco.

We will then shift to closed session. The first classified topic will be Aegis testing, followed by Admiral Walter's testimony on the battleship reprogramming request, and then Admiral Thunman's presentation on the new design submarine. Admiral Thunman will be accompanied by Mr. Gerry Cann, Mr. Paisley's principal deputy.

Senator Nunn is scheduled to attend. Also later this afternoon Senator Wilson is very interested in talking about the battleship reprogramming. He will be here at 3:45.

Mr. Watt, I believe you have some preliminary remarks you would like to make, and then we will address some questions to you.

STATEMENT OF CHARLES WATT, ACTING DIRECTOR OF THE DEFENSE TEST AND EVALUATION OFFICE

Mr. WATT. Yes, Senator, I do. I think there are two particular areas I would like to highlight that previously have been indicated as of interest to this committee.

First, I will address the Director of Test and Evaluation's relationship to the services and support provided to the Office of Secretary of Defense in the decision process for acquisition of major weapons systems such as Aegis.

The Director of Defense Test & Evaluation assessments are based primarily on data provided by servcie program managers and test commanders. Summary reports are submitted directly to the Secretary of Defense, the acquisition executive and the defense systems acquisition review counsel on all major programs.

Although test and evaluation is one of many variables, our inputs are considered at major decision points. Our views are incorporated in the Secretary of Defense's decision memorandum.

These, of course, are the documents that provide service direction on major weapon system acquisition.

The second area I would like to address briefly is the approach that was taken for the test and evaluation of the Aegis system.

First, I would like to state that it was a progressive approach that was taken to test and evaluation and it certainly was consistent with our policy for major platforms.

If you look at that progressive approach, the first item was simulation test and evaluation of the system at the land-based test site.

The next item was the insertion of production representatives subsystems as they became available to the land-based test site.

I would like to add that this phase also had the participation of the Commander of Operational Test Forces early in the program.

The next step was the test bed early in the program on the *Norton Sound*. In this particular stage there were a multiple of missiles that were fired in a realistic environment.

The next stage was an at-sea qualification testing of the lead ship, the *Ticonderoga*. Again, we had a multiple of missiles fired in threat representative operations.

Of course, the next test is a series of at-sea operational test and evaluation period under the control of the Navy's Commander, Operational Test and Evaluation Forces, known primary as the OPEVAL.

Last, we have a series of follow-on test and evaluation events that are now scheduled for the future.

My point in reviewing this series of events and looking at these circumstances is that a broad system view must be taken to appreciate the test and evaluation results over a period of many years.

This does not imply that there is a substitute for test and evaluation under control of the Navy's independent test activity. It is just that the decision process must consider a multiple of variables.

I thought this would provide us a bit of background to depart from for further questioning.

Senator COHEN. Mr. Watt, I have some general questions, initially.

CAPABILITIES OF AEGIS SYSTEM

In your opinion, do the test results conducted thus far demonstrate the Aegis system can defend the carrier, and the Aegis ship itself, against aircraft and missiles approaching below 30 feet in altitude?

Mr. WATT. Senator, we have done a number of tests at all altitudes including low altitude.

The answer to this question really is that we still have additional tests scheduled and certainly if we look at the advanced threat of the Sea Skimmer at supersonic speeds, this part of the test system requires further investigation.

But the tests that have been done thus far demonstrate potential for both performance effectiveness and suitability for the Aegis as a weapon system.

Senator COHEN. When you say demonstrate potential, do you mean it does not have it now?

Mr. WATT. No. I just said we have further tests to demonstrate the full ranges of the threat.

Senator COHEN. Were you here when Congressman Smith testified last time?

Mr. WATT. No.

Senator COHEN. Let me see if I can paraphrase what he was saying.

My understanding is that he said he would like to see the Aegis tested against 200 targets simultaneously with targets employing a number of different evasive tactics.

Has Congressman Smith talked to you or your office about this?

Am I correct in my understanding of what he would like to do?

Mr. WATT. Congressman Smith has talked to my predecessor, Isham Linder, relative to the test itself. Whether he went into detail in the sense of the 200 missiles, I do not know.

I do understand from reviewing the testimony that the Navy did give an answer on the complexity of tests and the difficulties when you run an operational test with a large number of support aircraft and surface ships.

To me the fundamental question is how many can you test in a scenario and how many do you need to test and, of course, that is the difficulty of the 200-missile question that Congressman Smith presented.

TESTING 200 TARGETS

Senator COHEN. I am unclear on this point because, as I recall his testimony, he was not talking about simultaneous testing of 200 targets.

Frankly, is that feasible to do?

Mr. WATT. That would not, in my opinion, be practical.

If you look at the numer of targets that are needed to stress the Aegis system, which I think was one of his questions or the nature of his question, a fundamental requirement is that we have sufficient targets in inventory, particularly at the low altitude, our discussions with Congressman Smith reviewed the extended range of the 34E that we currently have in inventory as well as the extended range of Vandal which is now coming online.

So, we addressed, first of all, what we had in inventory and what we have programmed in out years.

If you look at the total target budget for the Department of Defense, we had over a period of 1984 through 1989 over $1.7 billion in the defense budget for targets.

Senator COHEN. My impression was that he was suggesting we ought to have a total of 200 tests going the full gamut, and not a simultaneous attack by 200 targets.

Perhaps you can clarify this with somebody in your office. It is important to clarify it for the record.

Basically what you are saying is that it would not be feasible to conduct such a test in the first place.

Mr. WATT. Certainly with anywhere close to that in the way of a simultaneous scenario. There will be a number of tests that exceed this number (200 targets) over a period of years in that we have some 21 major systems tests that are scheduled through fiscal year 1990.

The exact numbers I do not have. If you would like that for the record, we will have to determine if the detailed test planning is far enough along that the number is specified yet.

[Additional information follows:]

AEGIS FIRING TESTS

Senator COHEN. My impression was that what he was suggesting is that we ought to have a cumulative or total 200 tests going the full gamut and not a simultaneous attack as such of 200 targets.

Perhaps you can clarify this with somebody in your office. It is important to clarify it for the record.

Basically what you are saying is that it would not be feasible to conduct such a test in the first place.

Mr. WATT. Detailed planning for Aegis missile firing tests between now and 1990 is not sufficiently complete that the exact number can be stated, but it will certainly exceed 200. The actual number depends on such variables as number of missiles expended per target and the level of success achieved in each firing phase.

MORE TESTS NEEDED

Senator **Cohen**. In your judgment, do we need to have more tests with targets at low altitude, supersonic, and if so, how many more tests will be necessary before you are satisfied that the Aegis can in fact carry out its mission?

Mr. **Watt**. In my judgment we do need more tests, we need the supersonic Sea Skimmer for sure because that is the area in the envelope that we found that we had less than desirable performance and we also did not have quite the target speed that we would like to have it.

I would like to give you an absolute number as to how many we need. I just don't have that answer.

Certainly of the tests that we will do, I would say that somewhere around a third of those will probably be concentrated in the areas that we have had problems, somewhere in that range.

[Additional information follows:]

Supersonic Low Altitude Targets

Senator **Cohen**. In your judgment, do we need to have more tests with targets under 30 feet in altitude, supersonic, and if so, how many more tests will be necessary before you are satisfied that the Aegis can in fact carry out its mission?

Mr. **Watt**. We do need to conduct such firings since this type of target is representative of a significant part of the threat. How many operational test firings are needed is a difficult question, because the answer depends in part on the results achieved. The more successful the tests, the fewer are needed to demonstrate a given level of performance.

Senator **Cohen**. By saying we need more testing, the Navy is planning that in any event, is it not?

Mr. **Watt**. Yes; it is.

Senator **Cohen**. What is the timeframe for those tests?

Mr. **Watt**. We have one series of operational tests that will be within the next few weeks.

Senator **Cohen**. Do we need to test against crossing targets?

Mr. **Watt**. We have tested against crossing targets. We will continue to do so.

Senator **Cohen**. Do we need more?

Mr. **Watt**. Yes; we need to investigate the envelope completely including crossing targets.

Senator **Cohen**. Also testing against multiple targets?

Mr. **Watt**. Yes.

Senator **Cohen**. In view of the fact that we do need more testing, do you nonetheless recommend we go forward with further construction of the Aegis ships?

Mr. **Watt**. Senator, I will give you an answer, but let me caveat it with the fact that mine is not to determine procurement buys, but to determine the quality of our testing and testing adequately.

But from a test viewpoint of what we have demonstrated through the entire series and sequence of tests I have outlined in this benchmark hearing, including what we tested, yes, I would support further construction of the Aegis group.

Senator **Cohen**. And with the lead ship of the DDG-51 guided missile destroyers?

Mr. **Watt**. Yes, sir.

Senator COHEN. Senator Hart has some questions for the record that I will submit to you.

Thank you very much.

Mr. WATT. Thank you, Senator.

Senator COHEN. Mr. Paisley, Admiral Walters, Admiral Baciocco, and Captain Donegan.

STATEMENT OF HON. MEL PAISLEY, ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH, ENGINEERING AND SCIENCE

Mr. PAISLEY. Mr. Chairman, I am sorry, I missed the first part of this hearing the other day. As you know, there are a lot of things occurring at the same time.

We are now at a point where we could pick up on the first subject you want to continue discussion on which will be Aegis testing. Bob Walters will pick that up at this point.

STATEMENT OF VICE ADM. ROBERT L. WALTERS, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SURFACE WARFARE

Admiral WALTERS. Mr. Chairman, as you know, we discussed the subject of Aegis testing in open session at considerable length last week.

I request we go to closed session now because I think what we have to talk about now will be classified.

Senator COHEN. The subcommittee will now go into executive session. The room will be cleared except for those individuals who are cleared for such testimony.

[Whereupon, at 3:06 p.m., the subcommittee proceeded in executive session.]

EXECUTIVE SESSION

The subcommittee proceeded in executive session at 3:08 p.m.

Members present: Senators William S. Cohen, Pete Wilson, and Sam Nunn.

Staff present: Arnold L. Punaro, staff director for the minority; L. Wayne Arny III and Mark B. Robinson, professional staff members; Kathleen L. McGuire, staff assistant.

Also present: James H. Dykstra, assistant to Senator Cohen; Dale F. Gerry, assistant to Senator Cohen; Mark J. Albrecht, assistant to Senator Wilson; Francis J. Sullivan, assistant to Senator Stennis; William S. Lind, assistant to Senator Hart; and James Steinberg, assistant to Senator Kennedy.

Senator COHEN. We will probably go back into open session later and discuss the battleship reprogramming.

Admiral WALTERS. There is nothing classified about the battleship.

Senator COHEN. Why don't we proceed now.

Admiral WALTERS. I would like to begin with a brief review of the way we developed the Aegis weapon system and the impact that rapid changes in the threat have had on development.

Conceptual design of Aegis began 20 years ago. The cornerstone of its design were based on the nature of the threat as it was known at that time.

The cornerstones were—and remain: Fast reaction time, maximum firepower, electronic countermeasures resistance, broad area coverage and high system availability.

These cornerstones have remained constant over the years even in the face of improvements in threat missile performance.

What we defined as the low altitude threat 20 years ago was represented by the SS-N-2, or STYX, anti-ship missile [deleted].

The STYX was subsonic, had a [deleted] range of 25 miles and could be fired only by a small surface combatant. The high altitude threat 20 years ago was represented by the AS-3 (or Kangaroo) which [deleted] had a maximum range of about 200 miles.

In the 1970's, the submarine-launched Siren (SS-N-9) was introduced which improved on the STYX by lowering the cruise altitude [deleted].

During that same decade, we also saw surface-launched ASCM's introduced [deleted] (specifically the SS-N-12).

By the 1980's, the threat included high altitude missiles [deleted] (AS-4) and low-altitude missiles [deleted] (SS-N-19).

The latest in low-altitude improvements brings the threat down [deleted] under highly favorable environmental conditions (SS-N-22).

That is represented by the SS-N-22 just introduced by the Soviet Navy [deleted].

The Aegis system has had, and continues to have, the capacity to evolve with those improvements in threat performance. We have made changes in the past to match improvements in cruise missile performance and will make further modifications to the Aegis radar to handle the projected threat of the 1990's.

Our testing program has been an integral and vital element in our ability to keep Aegis abreast of the threat.

Component and subsystem development and testing began in 1970 and the first full Aegis system was installed in U.S.S. *Norton Sound* in early 1974.

Testing began that year and has continued through the current calendar year. Ten years of testing in *Norton Sound* has involved both development tests and operational tests.

By 1978, when the first Aegis cruiser was appropriated by the Congress, *Norton Sound,* our first ship, had already fired 28 missiles against a variety of Navy targets. She had accumulated thousands of hours of at-sea experience and had conducted hundreds of similated engagements against Navy aircraft.

Concurrently, at Moorestown, NJ, a land-based model of the Aegis system had been completed and development testing on that system has been conducted ever since.

A number of milestones in operational testing have also been achieved at the Moorestown site under the command OPTEV for observation.

The Aegis test program has been the most comprehensive and demanding of any new development ever undertaken by the U.S. Navy. Over 32 percent, or $160 million of the R&D budget, has been assigned to and spent on the test program.

The program includes four basic categories of tests:

First, engineering tests involving component and subsystem testing to validate that each element of the system meets required values. Engineering tests are a crucial part of modern engineering development and are accomplished with rigor and discipline.

Second, environmental tests are conducted to ensure Aegis can meet environmental requirements. For example, complete cabinets are tested for shock, vibration, temperature and humidity while operating under maximum power.

Third, developmental tests are conducted for two reasons.

The first is to establish that the system can meet all requirements at the system level, and second, they are conducted to certify the system is ready for operational tests.

To aid in the latter, all development tests include both firing and nonfiring exercises. In every case, those tests have been conducted in the Aegis program by Navy officers and Navy enlisted personnel.

Finally, operational testing of Aegis began in U.S.S. *Norton Sound* in 1974. COMOPTEVFOR composed all the scenarios for this phase of testing and exercised the ship in an unaltered, warlike environment.

We conduct operational testing under conditions of maximum stress; that is, in excess of threat capabilities, to ensure we come as close as we possibly can in identifying any weaknesses.

I touched on the subject of realism in testing the other day in open session. I would like to expand on that now.

As I indicated last week, a variety of targets were flown in OPEVAL against *Ticonderoga*:

Sixteen were flown in ECM and CHAFF.

Seven at supersonic speeds.

Four at an altitude of 100 feet or less.

And there were three multiple target engagements. Some of these were also crossing targets.

Those are the statistics, but let's look in more detail. Jamming was imposed by both Navy EA-6B and Air Force NKC-135 aircraft.

One NKC-135 can radiate [deleted] when flying [deleted] from TICO. This is equal to [deleted] the expected stand-off ranges which Soviets use [deleted].

Current projections of a [deleted] Backfire raid against a battle group indicate [deleted] Backfires will be in position to jam at any one time. We expect them to jam at a variety of frequencies based on their estimate of battle group capabilities.

Our projections are that a raid of that size would allocate [deleted] against the SPY radar. Between one and two times that amount was used during OPEVAL against the *Ticonderoga*.

Two NKC-135's were actually used in conjunction with EA-6B aircraft and CHAFF on many of the targets presentations.

In addition to those jamming levels, we also use targets that replicate 99 percent of the current threat in performance, but in fact have smaller radar cross sections.

For example, an AQM-37 target flies [deleted] pitches over and makes a steep dive toward the ship. That accurately represents [deleted] the Soviet ASCM threat.

We increase stress on the system beyond threat capabilities in this case by designating the AQM-37 [deleted].

A conventional AS–4/AS–6 type of ASCM has a radar cross section [deleted]. Similar examples can be drawn for all targets we use in our testing program.

[Deleted.]

We will introduce the Vandal ER target later this year which will fly within [deleted] altitude of an SS–N–22 which we believe will fly at an altitude [deleted].

As you know, the new SLAT target will be introduced [deleted].

Aegis critics tend to look only at terminal altitudes and speeds of the Soviet or Third World missiles and make the conclusion that we haven't done adequate testing against the threat.

I can assure you that if you wait until the missiles are in terminal homing phase to defend yourself, you are in trouble. We do not intend to fight ships singlehandedly as TICO was fought in OPEVAL.

We fight naval battles in a well-defined defense-in-depth approach. For example, we expect to knock out many of the Backfires with F–14's before they launch their missiles.

We work very hard to destroy all launch platforms—air, surface and sub-surface—before they launch their weapons. We defend ourselves against weapons that do get launched at the maximum range of our own surface-to-air missiles [deleted].

That is well before these missiles can get down to low altitude—and we conduct both developmental and operational tests in all of those regimes, including low altitude, to verify system performance.

The purpose of all this testing, including *Ticonderoga's* developmental and operational testing, has been to shake down the system, find its weaknesses and to correct them.

We have uncovered problems along the way and we have corrected them. We will test again to validate that the correction action was effective. Throughout the testing program we have verified that we have a remarkably capable system which satisfies the cornerstone objectives and can handle the threat as it has evolved.

It is a system which has raised the threshold of excellence to a new level, a quantum advance in capability with margin for the future. There is no other ship in the world which can operate successfully in the jamming, multiple target environment which this system can.

Although we are conducting operational tests of the Aegis system in *Ticonderoga,* it is impossible to decouple the missile employed from the test results, thus I want to also discuss the standard missile program briefly.

In the late 1960's, the SM–1, both Terrier and Tartar versions, were operational and included solid state design and adaptive control to better handle the high performance jet aircraft.

SM–2 Block I arrived in the mid-1970's to counter [deleted] cruise missiles. It could attack aircraft and cruise missiles [deleted] in Terrier ships, at altitudes [deleted].

A missile up-link [deleted] was added in this missile to obtain performance against the highly maneuverable cruise missile target.

By the mid-1970's the air-launched cruise missile threat had evolved to cruise altitudes [deleted] and speeds [deleted].

Thus, the SM-2 Block II program, initiated in 1976, was specifically designed to counter advanced AS-4 and AS-6 threat.

Senator **Cohen**. You encountered some fuse difficulties with the SM-2 missile, did you not?

Admiral **Walters**. Yes, sir.

Senator **Cohen**. Is that not the same [deleted] currently used on the SM-1 missile which is on the Aegis destroyers?

Admiral **Walters**. SM-2 Block II has a [deleted] device that is an upgrade of what is in the current SM-2 Block I.

I think that Captain Donegan intends to address that.

Senator **Cohen**. I will come back to the Captain.

Admiral **Walters**. [Deleted.]

The main focus was against the air-launched, high altitude, and high-speed threat because of the proportion of these missiles in the Soviet arsenal.

A parallel analogy exists for the low altitude threat. In the early 1970's standard missiles could attack cruise missiles [deleted] with a high probability of kill.

As enemy missiles became smaller and faster, we have had to improve our target detection devices which control missile warhead fusing.

The SM-2 Block II missiles now commencing production have these improvements. As the threat continues to evolve [deleted] futher modifications must be made to the fuse (target detection device).

We are now embarked on an RDT&E program for a major fuse upgrade to counter cruise missiles [deleted].

Senator **Cohen**. What is that fuse called for the SM Block II?

Admiral **Walters**. MK45, Mod 5 TDD which stands for target detection device.

Captain **Donegan**. We have a MK45, Mod 4, in SM-1. We have MK45, Mod 5, in Block II and MK45, Mod 1, which is identical to the Mod 4 in the SM-2, Block I missiles. I have a chart on that.

Admiral **Walters**. We are now embarked on an RDT&E program for a major fuse upgrade to counter cruise missiles [deleted] below [deleted].

The most stressing new missile now being introduced is the SS-N-22 [deleted].

We have a very advanced radar and weapon system in the *Ticonderoga*. It has already undergone some upgrade to keep pace with the changing threat. The system has tremendous potential to keep pace with the changing threat.

At the same time we must continue missile improvement to obtain optimum results against a very sophisticated airborne threat.

I believe we have both under control and our testing program will ensure that we do.

I will now be followed by Capt. Jack Donegan who will provide you with detailed information on the results of missile firings during the operational tests in April and September on the *Ticonderoga*.

Senator **Cohen**. Could we suspend so that I can catch this vote and come back?

We will stand in recess for about 10 minutes.

[Recess.]

Senator **Cohen**. We will continue.

Admiral **Walters**. Mr. Chairman, I might make one statement to clear up some misunderstanding on this fuse business which Captain Donegan is going to elaborate on.

The Mod 5 target detection device we have in the SM Block II missiles takes care of the problem that I think I described to you once before [deleted].

That problem is corrected in the Mod 5.

Senator **Cohen**. Has that been tested and proven to be corrected?

Admiral **Walters**. That is in the process of being tested and proven to be corrected?

Admiral **Walters**. That is in the process of being tested now with the SM Block II missiles which is undergoing test now.

Senator **Cohen**. How do you know it has been corrected if it has not been tested?

Admiral **Walters**. We have had some tests done, but we have not completed the tests. The initial results indicate that that problem was taken care of. [Deleted.]

Senator **Cohen**. Captain Donegan?

STATEMENT OF CAPT. JACK DONEGAN, AEGIS PROJECT COMBAT SYSTEM ENGINEER

Captain **Donegan**. Mr. Chairman, I am going to continue the discussion we were having last week in the open session on the OPEVAL results. I am going to concentrate this afternoon on the actual failures and the changes that have been put in the system as a result of those failures.

I will try to give you an example of each one. I will cover a little bit the overall testing which has already been mentioned and then wind up by describing some of the operations we had with the *Ticonderoga* while she was in the Mediterranean in the last few months.

Of course, these two statements by Admiral Carter from the operational report say:

This, most "dedicated OT&E of *Ticonderoga,* involved the most intensive, short of war, operational testing of a surface ship in the history of our Navy."

"*Ticonderoga* demonstrated formidable warfare capability under threat-test environment that would have totally overwhelmed any other ship in the fleet today."

Demonstrated Operational Effectiveness

Simultaneous warfare—AAW, ASW, ASUW, STW, command and control.
AAW engagements—Single and multiship and manned aircraft and drones.
ASUW engagements—Beyond radar horizon.
ASW engagements—Own ship and other units and single and multiple targets.

I think a better way to describe the testing he conducted is on the next viewgraph. We discussed it a little last week when he said he tested each warfare area, simultaneous warfare areas anti-air warfare area with engagement, anti-surface warfare with engagement and antisubmarine warfare.

He said that *Ticonderoga* ". . . Effectively demonstrated excellent capability against all those areas. There is no doubt in my mind that COMOPTEVFOR feels the ship is operationally suitable and effective."

Senator **Cohen**. What is the difference between excellent capability and effectively demonstrated?

Captain **Donegan**. This was a narrative part of the report. I don't know that there is any real significant difference.

Senator **Cohen**. He goes from effectively demonstrated to excellent capability.

Captain **Donegan**. Yes, sir. I don't think there was any significant difference between them.

OPERATIONAL SUITABILITY CRITERIA/RESULTS

Parameter, goal, and result:

- Mean-time-between system interruptions, [deleted], exceeded.
- Mean-time-between computer program errors [deleted], exceeded.
- Time to restore system interruptions, [deleted], faster.
- Restoration time from:
  - Scheduled maintenance, [deleted] faster.
  - System test, [deleted] faster.

These are some of the parameters that were required in the report as operational requirements. [Deleted] the goal for mean time between computer program errors. And [deleted] demonstrated.

The mean time between system interruptions goal was [deleted] demonstrated.

These numbers represent a good example of the build a little-test a little process that we went through over the years of the testing that Admiral Walters described. Computer program number started out at a relatively low figure, [deleted]. When we proceeded to various tests and on *Norton Sound* we watched that number grow as we got more experience and capability in the computer programs.

By the time *Ticonderoga* went to sea she had met the [deleted] number that was required.

In these tests in the operations in the Mediterranean she has exceeded that time. We now see a number [deleted] between errors in the computer program.

This is the box score [deleted]. What I will be discussing today is in the target presented category, specifically with [deleted] target presented in the April testing and [deleted] targets presented in the September testing.

We had 21 opportunities to fire against those targets. We fired 18 missiles [deleted].

Senator **Cohen**. You had 21 opportunities?

Captain **Donegan**. Those were the three we discussed last time [deleted].

Admiral **Walters**. That is where the system was down and the test system was telling him they were down.

It tracked aircraft and they did not believe it. They went ahead with the OPEVAL. They did not see those targets in jamming.

Captain **Donegan**. I want to discuss now the system problems and missile problems. I think we pretty much totally discussed in the open session last week [deleted].

As we said, all of the [deleted] systems problems occurred in April. They were corrected. We have not seen any recurrence to date.

Of the missile failures there were four fuse failures. It is a known problem in all the ammunition. As I said the other day, it is the subject of an aggressive correction program.

Now, this chart [deleted] illustrates what is called the coasted track problem. When the ship sees a jamming strobe, logic in the system is built to go into a logic which says since there is a jamming strobe, there must be a target.

It may not see a target per se. It just knows there is one. It sets up an angle track that is called the passive angle track.

There is another situation where the ship already holds the target in the clear and its target is passing into a jamming strobe. [Deleted.]

The mission of the system is to not only have angle data on that target, but to get range data on the target in order to conduct missile engagement.

To accomplish this, the system fires [deleted] and tries to locate the target in that vicinity.

[Deleted.]

[Deleted.] That is what happened last April.

There are four such engagements. [Deleted.]

What have we done to correct it? [Deleted.]

[Deleted.]

In fact, we did not see any problems in the conducted test of this type in September. I don't know if we will get into this logic problem in the upcoming test.

[Deleted.]

I believe we have not found anything here that is out of the realm of the engineering boundaries we have set up. They were logic problems. We discovered them in our engineering and we corrected it.

I would like to go now to the missile problem. That is, the nature of the [deleted] problems that the standard missile encounters [deleted].

[Deleted.]

[Deleted] it presents the missile as a dichotomy and it has to sort it out. When we see this type of problem, [deleted]. So, seeker improvements [deleted] are part of the improvement program we have going in standard missile block II.

The other test is the one we have already talked about [deleted]. The way this works [deleted].

Unless the missile flies within this range of the target, it won't properly fuse. [Deleted.]

Senator Cohen. Stop right there for a moment.

You said that the new improved missile is correcting the problem you have with the reflection bouncing off. Is that right?

Captain Donegan. Yes, sir.

Senator Cohen. I think you indicated earlier the high flying is not a problem, there is no real reflection to deal with. If it is low enough, the two tend to merge.

The second step you mentioned, you are talking about a low-flying target coming in.

I don't understand the difference. If it is up high, there is not a problem. If it is down low, it is not a problem, it is when it is in between. Yet you just described a low-flying———

Captain **DONEGAN**. There are two problems.

The first has to do with the seeker in the missile being able to properly get the missile close enough to the target [deleted]. They are both subjects of the block II improvement.

Senator **COHEN**. Has your missile tests shown that you have corrected that problem?

Captain **DONEGAN**. Yes, sir. Our tests in a simulation laboratory where we put up an actual seeker or fuse and move it against this type of target said that we will be able to get the discrimination.

Admiral **WALTERS**. If I can clarify that a little bit, Senator, what effectively happens [deleted].

When you get in that regime, the missile has a problem [deleted].

It is that latter problem that we have to work on [deleted]. I think he is going to discuss that.

Captain **DONEGAN**. We have discussed several times the actual performance of the fuse. This curve is the performance of the fuse versus altitude, the probability of proper fusing versus altitude for the fuse that is in the SM-1, block VI, and it is SM-2, block I.

As you can see [chart deleted] the probability between 50 feet and 25 feet falls off by almost half.

We have said this afternoon that the SM-2, block II ammunition, the mod 5 fuse that is in it, goes to continuous range pullback. It does not pull back in steps. With other features we expect that we are going to see an improvement [deleted].

Eventually it will roll off much slower than our present ammunition. This modification will come 2 or 3 years from today.

What we are doing is modifying the fuse to have better low altitude performance [deleted].

With that, we expect to be able to see performance [deleted].

This is a picture of how that might work. As the missile comes down and approaches the surface of the water [deleted]. We should get proper fusing under these conditions.

[Deleted.]

Senator **COHEN**. In terms of the operational tests, how many passes were there [deleted].

Captain **DONEGAN**. I think in the operational test I described earlier there were [deleted].

Admiral **WALTERS**. At the time of those tests, Mr. Chairman, we had no capability to fly a target lower than [deleted]. We have since demonstrated low altitude hits in a BQM series of drone.

I think the minimum altitude that we have been able to control that drone [deleted]. That has been demonstrated in the Pacific Missile Test Range.

Senator **COHEN**. Do you intend to test the Aegis against that target [deleted]?

Admiral **WALTERS**. Yes, sir.

Senator **COHEN**. When?

Admiral **WALTERS**. This spring.

Mr. **PAISLEY**. It is even closer than this spring.

Admiral **WALTERS**. I forgot we are in closed session. The tests are the 23d of April until about the 4th of May. The *Ticonderoga* is leaving the Mediterranean en route to Puerto Rico where she will operate at the test range. I think the test starts the 23d.

Senator **Cohen**. How often were maneuvering targets presented in the OPEVAL?

Captain **Donegan**. I will have to submit the exact number for the record. [Deleted.]

Senator **Cohen**. How often were crossing track targets presented?

Captain **Donegan**. I think it numbers about six.

Senator **Cohen**. How many firings were conducted in ducting?

Captain **Donegan**. I don't think that we have a record of the ducting conditions that were existing at the time. Ducting has not been reported as a factor in any of the engagements that took place.

Admiral **Walters**. Ducting is normally not a problem in the test area.

Senator **Cohen**. In the next tests to be conducted, how many will be conducted [deleted]?

Admiral **Walters**. Admiral Baciocco?

STATEMENT OF VICE ADM. AL BACIOCCO, DIRECTOR OF THE NAVY'S OFFICE OF RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Admiral **Baciocco**. Admiral Carter, the Commander, Operational Test and Evaluation Forces, has designed the specific test scenarios and those are kept very close, they are not circulated prior to the OPEVAL especially not to the ship.

I know at the Secretary's direction there are profiles [deleted]. Specifically how many, I don't know.

Senator **Cohen**. Will we be advised?

Admiral **Baciocco**. Absolutely.

Senator **Cohen**. Does the Soviet Union have any missiles capable of homing on emissions from the Aegis radar?

Admiral **Walters**. Not to my knowledge. I asked the Director of Naval Intelligence the question just last week.

Senator **Cohen**. Captain Donegan, the staff has handed me a question to ask you.

One argument developed against the Aegis system is that it is a beacon and can be defeated by air antiship missiles.

If it is, why isn't the Aegis system affected by a missile designed to hit radar?

Admiral **Walters**. This system is about the toughest one to fire HARM against. It constantly changes frequency and is a very powerful system. It has a broad range of frequencies over which to operate.

The tests that we have conducted [deleted].

Senator **Cohen**. Senator Nunn?

Senator **Nunn**. I have one question, Mr. Chairman.

Have you looked at the AS–4 threat, the high-altitude cruise?

Admiral **Walters**. Yes, sir, we have.

The AS–4 threat has specifically been tested by the Aegis system and that involved a flight with the [deleted] target [deleted].

Those engagements were made, both before terminal dive and after terminal dive and we have had successful intercepts in both regimes.

In other words, you have an engagement opportunity at level flight and you have another engagement opportunity after it has made terminal dive. We have made intercepts in both regimes.

Senator NUNN. You feel comfortable in being able to deal with that?

Admiral WALTERS. I feel very comfortable in being able to deal with the high altitude, high-speed threat as it exists today.

Senator NUNN. How about as it will exist in 2 or 3 years?

Admiral WALTERS. If, as is postulated by the intelligence experts, the Soviets have the capability of extending their altitude [deleted], then we are investigating now what is necessary to improve the kinematics of our missiles [deleted].

[Deleted] the range where we can expect high-kill probability at the same time.

Senator NUNN. You say you cannot deal with that threat?

Admiral WALTERS. I am not saying we can't deal with it. We can't deal with it as well. No, it does not exist yet.

Senator NUNN. That is all.

Senator COHEN. Senator Wilson?

Senator WILSON. I have no questions at this point, Mr. Chairman.

Senator COHEN. We have other questions, but I will put those in the record either in the open or classified section of the report.

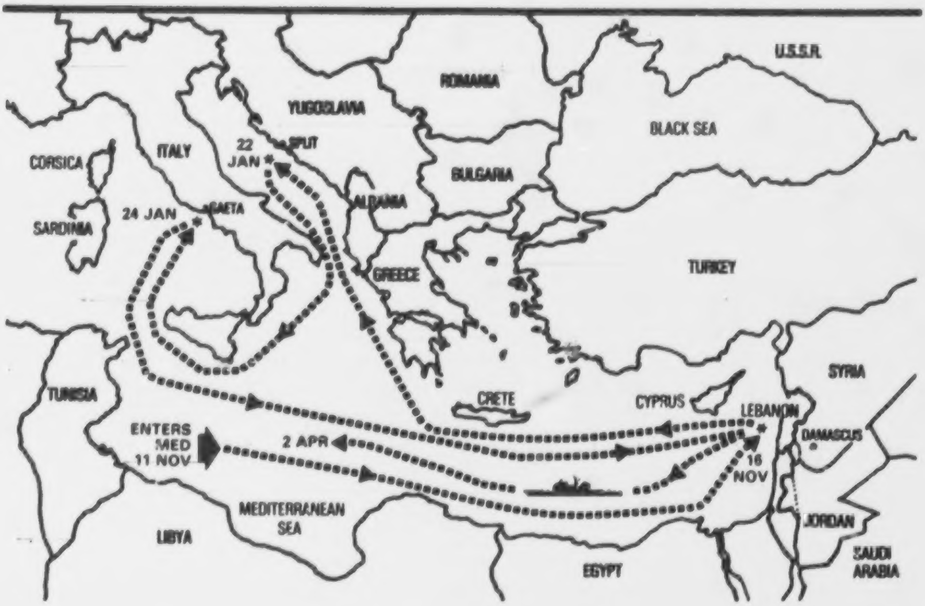
Thank you very much.

Captain DONEGAN. I did have a few more charts on the *Ticonderoga* operation in the Mediterranean.

Admiral WALTERS. I think the operation in the Mediterranean is worth your time, Senator, if you have the time.

Senator COHEN. We would like to move quickly and finish up if we can.

TICONDEROGA ON STATION


U.S.S.R.
ROMANIA
YUGOSLAVIA
BLACK SEA
CORSICA
ITALY
22 JAN
SPLIT
BULGARIA
ALBANIA
24 JAN
GAETA
SARDINIA
GREECE
TURKEY
SYRIA
TUNISIA
CRETE
CYPRUS
LEBANON
ENTERS MED 11 NOV
2 APR
DAMASCUS
16 NOV
MEDITERRANEAN SEA
JORDAN
LIBYA
EGYPT
SAUDI ARABIA

Captain DONEGAN. She has been in the Mediterranean since the 11th of November and she departed Rota today to head for the Caribbean for further tests.

Most of her time has been off Lebanon in support of the operations there; 120 days on station. Three-hours maintenance per week. We inspected her in preparation for the test and found her to be in excellent material condition.

She left Rota today with no casualty reports outstanding. She is continuously supporting multiwarfare environments.

Beirut is on this chart. This map of the coastline, of course, shows up when you are on board the *Ticonderoga*. This is the actual printout of what you will see if you look at the large screen display.

Here is Beirut. You will see a map of the coastline with the various cities marked out.

Here is the *Ticonderoga* and the carrier she was operating with. These lines are the airlanes of commercial traffic. Basically her job was to monitor flights along any of these airlanes of commercial traffic and sort out the commercial and friendly traffic from any potential hostile traffic.

This, for example, is very similar to the track I showed up the other day on the multiple firing engagement, except in this case, this is continuous of when he came on station. We kept him on continuous track, providing his position to the rest of the force, including the time he took a little sojourn over here to look at what was a potentially hostile aircraft.

This is the plan view of that from the time he camé on station until he landed back on the carrier, a continuous track like this [deleted], an exceptional performance for any ship.

This track is interesting. It occurred on the 14th of December. Track No. 103 is the battleship firing in the series. Here is the elevation view of that shot. We were able to track the battle shells anytime we wanted to over there.

This is another example of the kind of data that the *Ticonderoga* was able to provide for the antiwarfare coordinator while she was in operation over there. This is early in the morning on the morning of December 4, 1983. That is the morning [deleted].

What you see here is aircraft track leaving the carrier en route to the coastline. Here is the first raid and the beginning of the second raid.

Next on this track history, you can now see the second raid is fully formed up and the first raid has begun and what happens is that the aircraft were hidden from view behind the mountains over Syria. The tracks coasted for a few seconds until they realized they had gone.

They were picked up again as a new track. This was keeping both the operational commanders that were running this operation informed.

Here is the first wing of that attack coming out.

The final chart shows the situation a few minutes later. All three wings of that attack have returned and the rendezvous of the airplanes to finish their attack shows up out here.

This is the kind of data the *Ticonderoga* has been providing in the Mediterranean. Her performance in supporting antiwarfare operations off the coast of Lebanon has been exceptional. It has been commented on by all of our operational commanders.

I think that this is another very important facet of the operation of this kind of warship that we are going to have now in our fleet and doesn't get focused upon because of the way we have been detracted by the rather small focus on the box score issue whose performance in the first report appears much worse than it actually was.

I think we should be happy with this kind of performance on this ship.

Senator COHEN. You have to separate out the capability of tracking targets of aircraft or whatever. I suppose you could put that radar on a frigate or on a destroyer that could accommodate it and take care of that particular mission, but defending against an air attack is something else.

Captain DONEGAN. I don't dispute that.

Senator COHEN. I think that is where the criticism has been leveled, not to try to minimize it. You might have great radar and protection capability, and so forth, but if the argument is made that you can't survive a low altitude cruise missile coming in, then maybe you should not build that expensive a ship on which to put that particular type of radar system.

That is obviously part of the argument. I am satisfied that when you build a ship, you don't wait until the end of 5 years and complete all the testing before you build the next ship. To me that is not the way to build a Navy.

But I do feel it is important that we conduct more of the tests as soon as we can.

Mr. **Paisley**. I want to be sure, Mr. Chairman, that you understand it.

To understand the fuse capability we have on board the ship now, I want you to be sure in your mind, the low altitude fuse capability needs to be worked on. We do have a marginal probability at 25 feet. That is the problem and we are working on it.

Some people walk off and talk about it and say that is solved, but it is not. We are working on it. So those missiles that are loaded out have lower probability.

By the way, Senator, the same way they have lower probability at high altitude for a different reason, this probability factor. So, we have the probability of kill problem at very low altitude and we are working on that problem.

Senator **Cohen**. I am satisfied that 10 years from now we will have an entirely different type of threat.

Mr. **Paisley**. You are right. That is what we are talking about in both cases.

The high altitude and low altitude is the threat we are addressing. It is coming.

Now, we can go into the battleship if you would like.

Senator **Cohen**. I think we should. We can do that in open session. I will decree this next session to be open.

[Whereupon, at 4:10 p.m., the subcommittee proceeded to open session.]

OPEN SESSION

The subcommittee proceeded in open session at 4:14 p.m.

Senator **Cohen**. We are now in open session. Admiral Walters, would you proceed?

Admiral **Walters**. Mr. Chairman, as you know, the Department of Defense has submitted a request for reprogramming of $73.4 million in fiscal year 1984 SCN savings to the battleship reactivation advanced procurement line.

This will permit the early induction of the *Missouri* into the Long Beach Naval Shipyard and will provide a 3-month early delivery of the ship. It will balance out the workload at Long Beach and avoid a reduction in force at the Long Beach Yard.

In addition, it will result in the reduction in the 1985 requirement for full funding of the line for the *Missouri*.

The performance of the *New Jersey* over the last 10 months has validated the decision to return the battleship to active service. Acceleration of the *Missouri* will provide increased operational flexibility and improve our crisis response capability.

The requested funds will support prefabrication and preavailability work at Long Beach Naval Shipyard including drydocking, tank cleaning, asbestos ripout, CHT prefabrication and distillate fuel conversion piping modification.

It will also fund other requirements needed to preserve the 3 month early delivery including the overhaul of 5-inch guns and fire control equipment at the Naval Ordnance Station, Louisville.

Preassembly of Tomahawk component procurement of special test equipment with 20- to 21-month lead time and commencement of the shipyard integrated logistics support effort will also be provided.

With regard to the reduction in force at Long Beach, if reprogramming is not approved, some 200 temporary employees would be released by mid-May. Temporary employees are hired and released by a public yard as dictated by the shipyard's workload and are not included in a formal reduction in force action.

A total of 211 permanent employees, however, have already received RIF notices. Of these, about 116 would have to be released and approximately 95 would be reduced in pay grade.

Senator **Cohen**. Are they all permanent employees or are some temporary?

Admiral **Walters**. What I have talked about represents 400 workers, 200 of which are temporary and 200 of which are permanent. No RIF's have been executed to date. Thus, we need timely action on the reprogramming if layoffs are to be avoided.

The Senate Appropriations Committee and the House Armed Services Committee have approved the request.

We are also considering the possibility of rolling the full funding of the *Missouri* from fiscal year 1985 to fiscal year 1984. We have identified a source of funds in the 1983 CVN line which would permit us to do this, but since we cannot reprogram funds across fiscal years, we will need congressional approval to transfer the money from fiscal year 1983 to fiscal year 1984.

This would then delete all requirements for battleship funding in fiscal year 1985 and result in some overall cost savings.

I would emphasize the point that we still need the $73.4 million reprogramming action already over here to kick off the acceleration in a timely manner and to save the 400 jobs at the Long Beach Naval Shipyard.

We are ready for questions.

COST SAVINGS ON REPROGRAMMING

Senator **Cohen**. You mentioned cost savings.

How much in the way of cost savings do you anticipate?

Admiral **Walters**. The cost-savings total from both the reprogramming action we have now and rolling the funding forward we anticipate will be at least $13 million.

That is primarily due to escalation in buying things earlier and getting some of the work done at fiscal year 1984 man-day rates rather than 1985 man-day rates.

Senator **Cohen**. Where do you get the $73.4 million? Is that all due to inflation?

Admiral **Walters**. $73.4 million comes in fiscal year 1984 from three programs because the contracts were made at less than we had budgeted. Those were in the SSN program, the LSD–41 program and CG–47 program and the exact amounts tasked to each of these three programs are in the reprogramming action.

Senator **Cohen**. Are there any disadvantages, in your judgment, that could result from the approval of the reprogramming.

Admiral **Walters**. No, sir. I think it is all to our advantage from the standpoint of the need for the ship, the personnel actions at the Long Beach Naval Shipyard and the fact that we certainly are going to save some money by doing it early.

Senator **Cohen**. What has been OSD's reaction to your request to fund the battleship cut of prior year funds?

Admiral **Walters**. It has been favorable. It is strongly supported.

Senator **Cohen**. Senator Wilson, do you have some questions?

Senator **Wilson**. An observation, Mr. Chairman.

Your questions to Admiral Walters and responses make the case. I am sorry that Senator Nunn has left the Chamber here. Before coming over, I had called him and we had a conversation.

The gist of the conversation was that he had no objection to this particular reprogramming, but was concerned as to whether or not this or any other reprogramming requested by the Navy would threaten the fiscal 1985 SCN program.

I was unable to answer that. As I understand the response to your questions, the threat is not present.

If that is the case, there seems to be no reason to hold up on this and every reason to go ahead and avoid the RIF's and save the taxpayers $13 million.

I understand, Mr. Chairman, of the four committees that share jurisdiction in this area, ours is the only one that has not fully signed off.

Mr. **Paisley**. Senator, if we could take a minute to make sure we have a good solid statement that Senator Nunn could see for setting aside his concern.

I think what we should do is address his concern and get it on the record.

Admiral **Walters**. May I ask Admiral Cooper as our Director of Budget to address that?

Senator **Cohen**. I don't think it will be a problem. I have just been informed that Senator Nunn does not have any difficulty with this reprogramming request.

He would like to reserve his ultimate judgment until he is satisfied, looking at the amendment, that it has no impact on other portions of the budget.

Senator **Wilson**. Wait a minute. That is a reasonable way to proceed except, as I understand, it is going to present a real time problem.

The problem I was concerned with is that the RIF has been delayed to April 15, if I understand correctly. The timing to satisfy Senator Nunn's concern will extend past that date. That is precisely why I am bringing it up.

Senator **Cohen**. I am advised by staff that the chairman of the committee, Senator Tower, intends to at least wait until we come back from the April recess to go forward with this.

Senator **Wilson**. That is precisely the problem. That is what I want to avoid. I assume you do as well.

Admiral **Cooper**. I think you will find that May 1 is essentially the date that we are looking for a cutoff.

Second, if in fact we know that that reprogramming is receiving no roadblocks, then we will not let those people go. I think May 1 is probably a good time.

I would like to make one more correction. That is that we have a signed letter from the Senate Appropriations and House Armed Services Committees.

The House Appropriations Committee heard this last Wednesday during reprogramming hearings and I do not expect them to really act on it until they get back from their leave. So, that will get to us by May 1. I think May 1 is a better time.

If we are assured it is going to go through, I am certain we will not go into any kind of RIF action.

Senator **Wilson**, Do I understand from that, that word will go to the shipyard that the RIF is delayed until past the May 1 date.

Admiral **Walters**. If we have an indication, Senator, that they have no objections to this and it appears that the approval from all four committees will occur within a matter of days, yes, sir; we will do that.

We will notify them that we expect favorable congressional action and that RIF action will be delayed.

Senator **Wilson**. Are you telling me that you feel you have received such assurance today?

Admiral **Walters**. From this committee, I believe we have, yes, sir.

Senator **Cohen**. Have you received assurance from the House Armed Services Committee?

Admiral **Walters**. Yes, sir.

Senator **Cohen**. What about the Appropriations Committee?

Admiral **Cooper**. They heard the reprogramming along with seven others a week ago Wednesday. I expected them to act on all these reprogrammings the week they get back from vacation.

Senator **Wilson**. Are they aware of the time sensitivity?

Admiral **Cooper**. Yes, sir.

Admiral **Walters**. We have signed letters only from Chairman Price and Chairman Stevens.

Senator **Cohen**. Is that timeframe sufficient for you to meet Senator Wilson's request, in terms of what the House is going to do, with the assurance that we intend to take action in the full Armed Services Committee the week we come back?

Is that sufficient to let the yard know that the people are not to be let go?

Mr. **Paisley**. It is very clear now, Senator. We are going to inform the yard, we are going to take care of that and set the date as May 1.

Is that satisfactory?

Senator **Wilson**. Yes.

Mr. **Paisley**. That is what we will do.

Senator **Cohen**. I will have to declare the next part of the meeting closed as well since we took this testimony in open session and had a number of questions reserved. We will go back in closed session now.

[Whereupon, at 4:25 p.m., the subcommittee proceeded in closed session.]

EXECUTIVE SESSION

The subcommittee proceeded in executive session at 4:25 p.m.

Senator COHEN. We are now in closed session.

Admiral Thunman?

STATEMENT OF VICE ADM. NILS R. THUNMAN, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SUBMARINE WARFARE

Admiral THUNMAN. I discussed the emerging Soviet submarine threat and how we plan to counter that threat through the development and construction of a new design nuclear attack submarine and the purpose of my briefing today is to give you a classified presentation of that threat and our plan to deal with the new design SS-N.

[Deleted.]

Admiral THUNMAN. As a matter of fact, this picture [chart deleted] was taken by one of our submarines [deleted] and the picture was taken in 1980 in the Pacific when I was commander of the submarine force in the Pacific.

We have been conducting these operations for a number of years. [Deleted.]

Senator COHEN. What accounts for that? Why are they going to the Arctic?

Admiral THUNMAN. [Deleted.]

Senator COHEN. How do you get this?

Admiral THUNMAN. [Deleted.]

Senator COHEN. [Deleted.]

Admiral THUNMAN. That is just to give you an idea of what we do to determine their capability.

Senator COHEN. What was the report that appeared in the Washington Times a couple days ago about the new tunnel that has been developed?

Is that accurate or inaccurate and what is the significance of it?

Admiral THUNMAN. [Deleted.]

Senator COHEN. [Deleted.]

Admiral THUNMAN. [Deleted.]

Senator COHEN. Yes.

Admiral THUNMAN. Yes, sir. [Deleted.]

Senator COHEN. [Deleted.]

Admiral THUNMAN. [Deleted.]

Mr. PAISLEY. [Deleted.]

Senator COHEN. No.

Mr. PAISLEY. [Deleted.]

Admiral THUNMAN. [Deleted.]

Senator COHEN. How do you counter that?

Admiral THUNMAN. I don't have an answer right now. [Deleted.] You may recall in my unclassified testimony I indicated that our maritime strategy calls for our attack submarines to go forward at once at commencement of hostility. [Deleted.]

In the unclassified briefing we talked about the threat and what we had seen during this timeframe of 1980 to 1984 which has caused us to design a new submarine. [Deleted.]

This gives us an idea of the size. [Chart deleted.] Here is the *Victor-3*. It became operational in 1979. The *Oscar* became operational in 1981, *Typhoon* also became operational in 1981.

1983 was a big year of a new design.

The *Mike* nuclear attack submarine [deleted]. That is now an unclassified number. It came out in a publication released yesterday in OSD. [Deleted.]

Senator COHEN. In terms of one of the criticisms we hear directed to the Navy from time to time here, that the Soviets are building an *Alpha* class [deleted], they have titanium hulls, [deleted], and so forth.

We come out with a new design submarine [deleted]. On the one hand, what is so attractive about the things they are doing?

Admiral THUNMAN. I don't believe they are building the *Alpha* any more. [Deleted] six operational, [deleted].

Senator COHEN. What is the advantage they are pursuing?

On the one hand, here is what they are doing with this capability, [deleted]? What is it that they are doing that is positive that we are not doing?

Admiral THUNMAN. [Deleted.]

Senator COHEN. Which, 688, the improved?

Admiral THUNMAN. I believe that when that statement was made, they were talking about the first 688's.

Mr. CANN. Mr. Chairman, I would like to give you another answer to that question that you just asked.

First of all, the 688 class was designed in the sixties. [Deleted.] Those are two of the most important parameters.

As you say by the video tape Admiral Thunman showed you earlier, one of the difficulties which we had in our process is that the submarines that we designed back in the sixties were [deleted].

Those are the two key parameters that have to be worked on.

Senator COHEN. Why don't you continue, Admiral.

Admiral THUNMAN. This is the *Sierra* class——

Mr. PAISLEY. Mr. Chairman, when would you like us to wrap it up?

Senator COHEN. In about 1 minute.

Admiral THUNMAN. I had a number of slides to show you the threat. It is a significant threat.

I was also going to take you through the new design, the capabilities of the new design, which will counter that threat. I strongly believe that it will.

If I can show you one slide, I would like to show you the kill ratio slide which shows why we need to move now with a new design submarine.

In my open testimony I showed an unclassified version of this. This describes what Mr. Cann was talking about. [Deleted.]

As they moved to their second generation, there *Victor,* the *Charley* class submarines, our first 588 came out. [Deleted.]

Here is our improved 688 against their *Victor*-3 and what we think the *Sierra* capability will be.

[Deleted.]

Senator COHEN. In the information I want you to submit for the record indicate why the new design will put us back up to where you have it on the scale.

Admiral THUNMAN. Yes, sir; I can do that.

Senator COHEN. I have had a briefing, but I think the information should be included in the record so that other members of the committee can have the advantage of it.

Admiral THUNMAN. [Deleted.]

[NOTE.—The information Senator Cohen is referring to is provided in the answers to questions for the record on Thursday, April 5, 1984.]

Senator COHEN. The other thing is if you will be kind enough to give me a synopsis of the recent exercises that were conducted by the Soviets so that I can have some appreciation of the numbers, the classes, what this portrays for the future. It will be helpful for me to talk in terms of what numbers they have, what we have, what their quality is versus where we are.

Just from my personal point of view, I would appreciate having that kind of briefing.

Admiral THUNMAN. Yes, sir.

Senator COHEN. Gentlemen, thank you very much. I regret to have to cut you short, but I have to return to the floor for a vote.

[Questions submitted by the Senators of the Armed Services Sea Power and Force Projection Subcommittee to be answered for the record are provided in the hearing held April 5, 1984.]

[Whereupon, at 4:53 p.m., the subcommittee adjourned, subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

TUESDAY, MAY 1, 1984

U.S. SENATE,
SUBCOMMITTEE ON SEA POWER AND FORCE PROJECTION,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NAVY'S MARK 92 FIRE CONTROL SYSTEM UPGRADE PROGRAM

The subcommittee met in open session at 10:07 a.m., in room SR-222, Russell Senate Office Building, Senator William S. Cohen (chairman) presiding.

Present: Senators Cohen and Wilson.

Staff present: Arnold L. Punaro, staff director for the minority; L. Wayne Arny III, Mark Robinson, and José E. Martinez, professional staff members; Patricia L. Watson, research assistant; and Kathleen L. McGuire, staff assistant.

Also present: James H. Dykstra, assistant to Senator Cohen; Mark J. Albrecht, assistant to Senator Wilson; and Francis J. Sullivan, assistant to Senator Stennis.

OPENING STATEMENT BY SENATOR WILLIAM S. COHEN, CHAIRMAN

Senator COHEN. Today, we are here to receive testimony from the Navy on the MK-92 fire control system upgrade program. The MK-92 is the fire control system installed in the FFG-7 class of guided missile frigates, and the upgrade program is designed to improve its antiair warfare capability.

The Navy is currently pursuing a part of that program referred to as the "Phase Two Upgrade." This portion of the upgrade is also referred to as the "CORT," and involves providing the system with a coherent receiver transmitter to improve performance considerably over the original equipment.

Of special interest today is the "Phase Three Upgrade" that is supported by many elements within the Congress. A Phase Three Upgrade would add a four-faced, fixed phased-array radar to the MK-92 to dramatically improve its performance in jamming.

I should note also that Congress did authorize funds in the fiscal year 1984 for construction of an additional frigate, and this committee recommended—I use that in quotes—that the frigate include a phased-array radar. The appropriations bill, however, mandated that the ship include the radar.

Since then, the Secretary of the Navy has stated the Navy favors building the frigate, but he requests not to include the new radar on it because of the technical risk, the cost, and the lower priority he assigns it relative to other improvements he wants to make.

Today, I am happy, on behalf of the entire subcommittee, to welcome our witnesses: Adm. Bob Walters, Deputy Chief of Naval Operations for Surface Warfare, and Vice Adm. Earl Fowler, Commander of the Naval Sea Systems Command.

Gentlemen, we are looking forward to your testimony, which I understand includes the Navy's view of the history of this issue, as well as the Navy's position. We need to get the information on record in complete form, and I expect that we will be discussing the following subjects.

One, what are the Navy's requirements for air-defense capability on ships which will not have Aegis or the New Threat Upgrade. Specifically, what are the Navy's AAW requirements for guided missile frigates and *Spruance*-class destroyers in the years ahead.

Two, should the Navy develop a phased-array or other radar system for guided missile frigates and ASW destroyers for which we cannot afford, nor desire, a full-up Aegis capability.

Three, how will the Navy provide air defense for underway replenishment groups and convoys, without the immediate presence of an aircraft carrier, as the sophistication of antiship threats increases in the future.

At an appropriate time, if required, this hearing will be closed, and we will move into executive session for discussion of classified material that might be necessary.

I am not sure whether Senator Nunn will be here, but his comments will be included in the record.

Admiral Walters and Admiral Fowler, you may begin in any way you see fit.

STATEMENT OF VICE ADM. ROBERT L. WALTERS, USN, DEPUTY CHIEF OF NAVAL OPERATIONS (SURFACE WARFARE)

Admiral **Walters**. If I may, Senator, I will lead off and be followed by Admiral Fowler.

Before proceeding to the 1984 ship, I would like to provide you with some background information on the overall FFG program. Prior to fiscal year 1984, 50 ships of this class were appropriated to the U.S. Navy. In addition, four were purchased by the Royal Australian Navy from U.S. shipbuilders. The lead FFG, U.S.S. *Oliver Hazard Perry*, was appropriated in fiscal year 1973 and follow ship construction began in fiscal year 1975. The largest construction period was during the years 1976 to 1984 when 41 ships were appropriated.

Ships have been constructed at three shipyards: Bath Iron Works in Bath, ME; Todd-Los Angeles, CA, and Todd-Seattle, WA. Of the first 50, Bath has delivered or is building 24, Todd-Los Angeles, 17 and Todd-Seattle, 9. Todd-Seattle also built the four Australian ships.

To date, 36 FFG-7's have been delivered to the U.S. Navy and another 5 will be delivered during the remainder of the calendar year 1984. By December 1986, all 50 prior year ships will have been delivered. For the past several years, the construction of FFG-7's has been characterized by early deliveries and cost underruns by the builders.

The mission of the FFG-7 is to provide self-defense and effectively supplement planned and existing escorts in the protection of underway replenishment groups, amphibious forces, and military shipping from subsurface, air and surface threats.

They are "design-to-cost" ships and do not include the most sophisticated antiair or antisurface systems available, nor did the Navy envision that they would be exposed to the most severe threat, unless in company with more capable forces. With the addition of the tactical towed array sonar system and the LAMPS helicopters, they will be highly capable ASW ships with a modest area AAW missile system and excellent self-defense capability.

Within the context of the 600-ship Navy, we have identified a requirement for 100 frigates of all types. In addition to the 50 FFG-7's which have been appropriated, we have 46 ships of the FF-1052 *Knox* class, 10 of the FF-1040 *Garcia* class, 2 of the 1037 *Bronstein* class, and 6 of the FFG-1 *Brocke* class. Eventually, 8 FF-1052 and 18 FFG-7 class ships will be assigned to the Naval Reserve Force.

During the fiscal year 1984 deliberations, the Congress authorized one FFG-7 not included in the President's budget. The fiscal year 1984 DOD appropriations bill funded the extra ship, but appropriated $116.4 million in new obligation authority.

Senator COHEN. Which, by the way, the Secretary of the Navy endorsed.

Admiral WALTERS. Yes.

Senator COHEN. So it does not go unnoticed.

Admiral WALTERS. Yes, sir.

In addition, the fiscal year 1984 bill transferred $183.6 million from fiscal year 1983 and prior year SCN savings to the fiscal year 1984 FFG-7 construction line, "provided that FFG-7 guided missile frigate shall be constructed with an upgraded MK-92 fire control system and an X-band phased array radar."

Thus a total of $300 million was made available by the Congress for a fiscal year 1984 FFG-7 with a MK-92 X-band phased array radar. For comparison purposes, in fiscal year 1983 the unit cost of an FFG-7, with a much less complicated radar, was $310.4 million. To build an identical follow ship in fiscal year 1984 is estimated to cost a minimum of $336.6 million.

The language of the fiscal year 1984 DOD appropriations bill which required the ship to be equipped with a MK-92 X-band phased array radar caused concern in the Navy, since the radar is not developed and it is not believed that it can be delivered and tested prior to the anticipated delivery of a fiscal year 1984 ship.

In fiscal year 1983, the Congress appropriated $40 million for the purchase of a MK-92 X-band phased array radar for installation on one of the fiscal year 1983 ships. This issue remains unresolved as this would require a phased array radar even earlier. The Navy has not expended any of the fiscal year 1983 $40 million appropriated as installation in the fiscal year 1983 ship is unexecutable during the ship conversion Navy envelope.

In an attempt to comply with the langauge of the fiscal year 1984 appropriation bill, in January of this year, the Navy requested the two shipbuilders involved in the FFG-7 construction to provide a cost and feasibility assessment for constructing one fiscal year 1984 FFG-7 with the MK-92 X-band phased array radar.

COST ESTIMATE OF MK-92 X-BAND RADAR

Each shipbuilder was requested to interface directly with Sperry Defense Electronic Corp., who is the sole vendor of the fire control system, in order to provide a cost estimate of the ship with the MK-92 X-band phased array radar.

Senator COHEN. Is this the first time that this has been done in shipbuilding history?

Admiral WALTERS. I believe it is, yes, sir.

Senator COHEN. Can you tell me why?

Admiral WALTERS. The reason is that we didn't have a production cost for the phased array radar, other than our own estimate. So we thought that if we had the shipbuilder go and do this, at least we would be able to confirm our own estimate of cost of both producing the radar and installing it.

Senator COHEN. But it does mark the first time that the Federal Government is not supplying a fire control system in terms of a price.

Admiral FOWLER. We have never bought a phased array radar before with a MK-92, so this is the only time we have ever asked the shipyard to get prices from Sperry, the vendor, for this radar.

We have often asked for the shipbuilder to procure equipment. For instance, for many of the cruisers, Litton Industries buys the sonar. So it has been done many times before. It is not uncommon.

I made the decision to have the shipyard go to Sperry for one simple reason, and that was because this was likely to be a very contentious issue. If I were presenting here today only my estimate of what the cost to build the ship would be, there would be some question about how good my estimate was.

It turns out that the shipbuilder's and Sperry's estimates are very close to mine. But at least I have a second point on the curve, really three points on the curve, to validate that these are pretty good estimates.

Senator COHEN. Did you have a firm fixed price contract with the contractor on this?

Admiral FOWLER. Do we have one now?

Senator COHEN. Did you have?

Admiral FOWLER. No; we did not, but we have proposals which theoretically can be converted into a fixed price contract.

Senator COHEN. Do you have them in your possession now?

Admiral FOWLER. Personally, I don't, but they are in our system so that we can move right to a fixed price contract.

Senator COHEN. Your estimate is not that much different from what the contractor has?

Admiral WALTERS. Not significantly, no, sir. They are all within the range estimated.

Senator COHEN. I am sorry to have interrupted. Go ahead.

Admiral WALTERS. Yes, sir.

Based upon the responses from Todd and Bath, minimum end cost of one FFG-7 in fiscal year 1984 would be about $473 million or $173 million more than appropriated in fiscal year 1984.

With the foregoing as background, I will review the history of the MK-92 fire control system and provide the Navy's assessment of the value of a MK-92 X-band phased array radar and the cost and risk associated with such a program.

Senator COHEN. Admiral Walters, is it the lead ship with this new system?

Admiral WALTERS. Effectively, it becomes the lead ship.

Senator COHEN. It will be the first one.

Admiral WALTERS. That is right.

Senator COHEN. Isn't it true that when you are talking about a lead ship, a first ship, the costs tend to decrease?

Admiral WALTERS. It is true that the cost of both the radar and the installation would tend to be higher, this being the lead ship.

The MK-92 fire control system first went to sea in the mid-1970's when an operational evaluation was conducted in U.S.S. *Talbot* FFG-4. The evaluation concluded that the system was operational effective and suitable for fleet introduction. The MK-92 fire control system was approved for installation in the FFG-7 and PHM classes.

After the lead ship was delivered, another OPEVAL was conducted in 1979 which revealed serious deficiencies in both performance and reliability. Its effectiveness was particularly reduced in heavy rain and/or in a sea/land clutter environment.

In March 1980, the MK-92 prime contractor, Sperry, addressed these problems by submitting an unsolicited proposal for development and simultaneous procurement of a four faced, X-band phased array radar upgrade. This proposal was rejected by the Navy Sea Systems Command because specifications were not clearly defined, the ship impact was not addressed, and it was predicated on procurement before testing.

In December 1980, RTD&E funds were added by Congress to develop an AAW upgrade for the FFG-7. Simultaneously, the CNO directed a three phase MK-92 upgrade program.

Phase I was to correct immediately all "quick fix" items. These primarily had to do with the reliability issue.

Phase II was to provide significant performance improvements in the clutter/ECM environment by development of a new coherent receiver transmitter called CORT.

Then phase III was to identify a major AAW capability improvement for installation during the midlife upgrade of the FFG-7 class.

The CNO program provides an orderly response to correct the MK-92 OPEVAL deficiencies identified in 1979 and to identify options for a potential midlife upgrade.

Phase I provided near-term improvements needed to effectively stabilize radar performance, particularly in clutter and in rain, and provided an automatic low elevation tracking mode. Phase I improvements have been tested at sea, and they have been incorporated in production since fiscal year 1981. They are being backfitted in all of the ships now, and all will be completed by the end of fiscal year 1985.

Phase II, the midterm improvement, required more extensive development of the coherent receiver transmitter, and will provide a dramatic increase in radar performance and reliability. The performance in a clutter environment will improve by 50 percent the significant gains made by phase I. Further improvements in electronic counter countermeasures and reliability will also be realized with phase II. The Navy is convinced that phase II provides the FFG–7's an AAW combat system that fully supports their mission and the installed standard missile–1 capability.

The CNO's plan for phase III was to identify a major AAW capability improvement for installation during the FFG–7 class midlife upgrade. Analysis conducted by the Navy and the Office of the Secretary of Defense incident to phase III definition concluded that an X-band radar upgrade beyond CORT, such as the phased array, did not provide a cost-effective gain in military capability.

To constrain the radar upgrade to X-band only would preclude consideration of other attractive technologies in alternate frequency bands. The Navy prefers industry-wide competitive development to design an improved state-of-the-art air defense radar and weapons control system for midsize combatants, such as the FFG.

The system would be capable of detecting, tracking and supporting weapons engagement against very small and fast targets in heavy clutter and ECM. Furthermore, it must provide significant improvement in performance over present systems. The Sperry X-bank phased array radar does not fully meet these requirements, particularly the requirement for significant improvement over present systems.

Radar performance assessment is very sensitive to the threat scenario and expected jamming levels. Sperry's assessment of the phase III performance is based on threat parameters that support an X-band radar and do not agree with the threat and jamming levels the Navy projects the FFG–7 to encounter. Moreover, the cost of development and the relatively high unit cost in series production mitigate against this approach for a marginal gain in performance and effectiveness.

Senator COHEN. Admiral, let me interrupt you here. I don't understand why spending, let's say, $70 million to protect a $350 million ship is not a good investment from a taxpayer point of view.

Admiral WALTERS. I can show you some charts that I had planned to show you at the end, which will show the improvement we get with phase II and how much that costs.

LIGHT/HEAVY JAMMING

Senator COHEN. Is that light jamming, or is that heavy to moderate jamming with phase II?

Admiral WALTERS. Phase II will handle light jamming, which is what we expect the FFG–7 to be exposed to.

Senator COHEN. What about that top level requirement, the document about the Frig 7, I am sure you are familiar with that, that didn't take into account light jamming, it took into account four Backfire's, as I recall, attacking a Frig 7 at one time with heavy jamming. So the frigate was unable to cope against that kind of an attack.

Admiral **Walters**. I will have to review that specific scenario, but a four Backfire attack, I don't consider to be a heavy jamming environment, that is a moderate jamming environment in comparison to——

Senator **Cohen**. Could a frigate handle that today?

Admiral **Walters**. I believe a frigate can handle that kind.

Senator **Cohen**. I don't think that that is what the study shows.

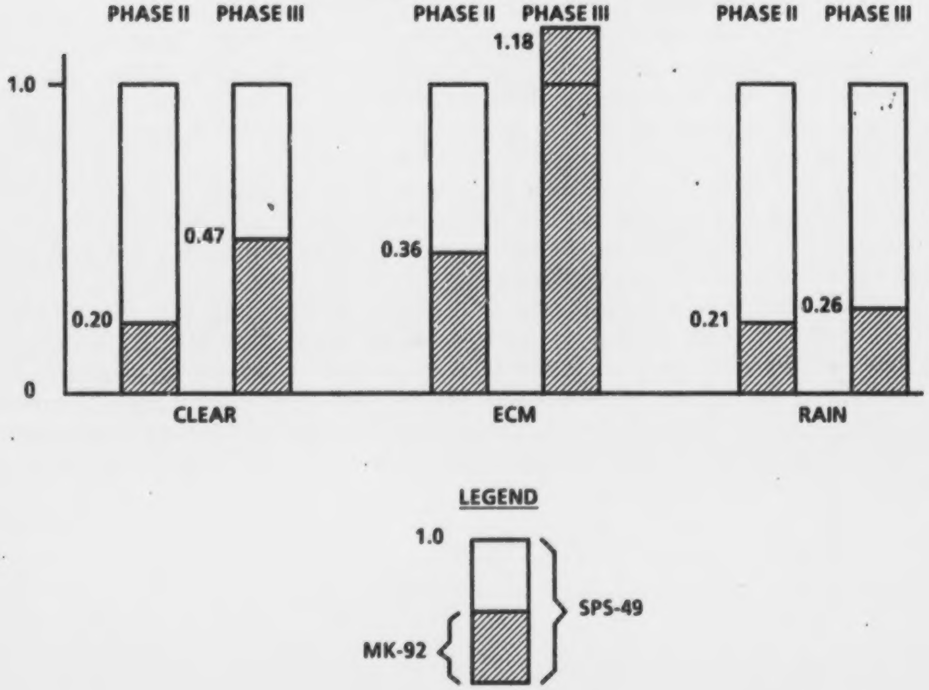
On the one we get the argument that we are really not going to use these frigate other than for a convoy in a light threat area. Then when we talk about the impossibility of predicting what is going to be a light threat area, there are no such things as light threat areas.

Then it becomes a question of how will they operate in a moderate to heavy environment. The answer is that they are not going to operate too well. The question becomes, Why shouldn't we try to give them a greater AAW capability?

I don't understand what the difference is. Can you tell me about CORT? What does that give compared to what the MK-92 phased array would give you in a moderate to heavy jamming situation?

Admiral **Walters**. Maybe I can show that by showing these viewgraphs that we have. I am not going to be able to talk in open session about specifics, but I can show you three or four slides with comparative information.

AAW DETECTION RANGE
FFG 7 CLASS WITH MK-92 IMPROVEMENTS
(VALUES NORMALIZED TO SPS-49 RANGES)



The first one shows the AAW detection range with the improvement that we are talking about in phase II and phase III. First in a clear environment, what this does, in order to make it unclassfied, it assumes that the SPS–49 radar, which is a long-range air search radar, is one unit. This detection range is obviously longer than any fire control radar. It shows that in a clear environment, you do get an improvement between the phase II and the phase III. This is the nature of a phased array radar, you will get more power.

In an ECM environment, you again see an improvement in the phase II, but the phase III is much higher because it is specifically designed with a side lobe which makes it more difficult to jam. The 49 radar, for example, is easier to jam than a phased array tactical radar. Most fire control radars are harder to jam than a search radar.

The other part of this shows that there isn't much difference in the performance of these two systems in rain. Our major concern was the performance of this system in clutter and in rain.

Our feeling is that the FFG–7 is not normally going to be exposed to the most intense threat. We could argue about whether it is 4 Backfire's or 20, but when we have a large——

Senator **Cohen**. Let me ask you. Take the frigates, how much does that make up of our surface combatant force?

Admiral **Walters**. It makes up half of it.

INCREASED SOVIET THREAT

Senator **Cohen**. I have been sitting here all spring listening to the increased Soviet threat, with the number of Backfire's that are being produced, with the fact that the Blackjack is going to be coming out giving them further fire power as well, with all of the new ships, with the *Mike* and the *Sierra*.

It seems to me that projections about what at one time was a low area threat, or the fact that we wouldn't use these particular escort ships in a high threat environment, all of those projections are totally obsolete. With the growth and size and capability of the Soviet fleet, there is virtually no area that we are going to be able to say we are going to put these ships into that will be relatively safe from a heavy or moderate environment.

I just have to question as to why we first build these frigates. We said, back in the early 1970's, we have these ships, the Soviets don't have that much of a navy, and we can cope with a low-threat environment. Now we are seeing a dramatic reversal of those projections.

Even though they make up 50 percent of the surface combatants, they are not really equipped to cope in a moderate to heavy environment. I am suggesting that every encounter is going to be moderate to heavy. There are no light areas any more.

Admiral **Walters**. I would disagree with that, Senator, from the standpoint that I think there are going to be areas in which the jamming levels and the attack levels are going to be lighter than others.

For example, if we have our convoys and underway replenishment groups exposed to the full force of Soviet naval and air force air, then we are already in deep, serious trouble because it will effectively mean that we will have lost that intermediate force that we will be placing in-between the serious threat and where we are going to be routing these other kinds of forces.

LOW THREAT AREAS

Senator **Cohen**. I just can't believe that if you have a conflict that breaks out that you are going to be able to assign low threat areas to frigates. I think we will have to use everything we have.

Admiral **Walters**. I hate to use the term "low threat," too. In a potential global conflict there is always a threat everywhere, but I think there are degrees of threat.

Senator **Cohen**. I am just concerned about the numbers, the Soviet ships that are being built, and their capability. I am just responding to what you have been telling me.

Admiral **Walters**. Yes, sir.

Let me put it another way. There is no question that we would like to be able to have every one of our ships with a good AAW capability. We would like to have them have a fast reaction capability to handle low flyer. We would like be to able to handle the heavy ECM environment. The problem is one of affordability.

The FFG-7 is primarily a ASW ship. It is designed to cost. Its design didn't even provide it with the best ASW system. My priorities today are to upgrade that ship as an ASW platform because that is the threat that we have when we leave port. So there is no argument that you always have the ASW threat.

When I look at the amount of money that we are going to have to modernize our fleet, the first priority on this class ship is ASW. Frankly, with the current reductions in the President's budget, I am going to have difficulty in doing that, and that comes in priority before upgrading its AAW capability for the reasons that I have stated. They are going to be in an ASW threat all of the time, and the ASW threat will be less than some of the other forces that we have.

Admiral FOWLER. Your argument is one that we agree with in concept. A lot of people propose that we build less capable and less expensive ships, and invariably then we find that they do not cover the full range of the threats, and we have expensive upgrade programs.

Senator COHEN. I am sorry, I didn't follow that. You say that a lot of people have been advising you to build less capable ships.

Admiral FOWLER. I said that in concept we agree with you the thrust of your questioning.

Senator COHEN. I have not heard anybody advise, or at least urge, except for maybe one member who is on the road in Texas some place, or Tennessee, talk about urging low capability ships. We have debated that from aircraft carriers on down, and the judgment always has been to build the best you can.

Admiral FOWLER. I had not thought about that Member, but there is an argument that has been going on in Washington for a long time about building submarines and surface ships that are smaller, less expensive, and less capable.

Senator COHEN. No, smaller, less expensive, and more capable. You may not be able to do that, but that has been the argument.

Admiral FOWLER. That was part of the argument, whether it can be done or not. Feasibility is one issue, and desirability is another. We are not advocates of less expensive ships that are incapable of doing the job that needs to be done. That is the central issue.

Senator COHEN. Nor has this committee been. You have gotten just about everything that you wanted plus the frigate.

Admiral FOWLER. We appreciate your support, particularly the chairman.

Admiral WALTERS. Let me try to answer the question maybe in a different way. Our principal investments in AAW systems have been in those ships that go with the battle forces and the amphibious forces, because we know that they are going to be in harm's way. There is no question of that, so that is where our major investments have been.

Senator COHEN. Do frigates ever go with the battleships?

Admiral WALTERS. The frigate could very well go with the battleships, yes, sir.

Senator COHEN. They are going to be out there protecting those battleships.

Admiral WALTERS. They will not be out there protecting the battleships.

Senator COHEN. Do they go with the aircraft carriers?

Admiral WALTERS. They do in peacetime, yes, because we rotate all of our forces for training. But in wartime, the structure of a battle force is not likely to include an FFG in it.

DESTROYERS WITH AEGIS CAPABILITY

Senator COHEN. How about your destroyers, how many of the destroyers have Aegis capability right now?

Admiral WALTERS. We have one at sea, but that is a cruiser.

Senator COHEN. The problem is that you don't have much greater capability in your destroyers which will be with the aircraft carriers, wont' they?

Admiral WALTERS. Today.

Senator COHEN. Tomorrow.

DDG'S

Admiral WALTERS. Yes, the systems that we have in the DDGs, for example, and the cruisers that go with the battle group today are more capable, far more capable, than the FFGs.

They are more capable from the standpoint that they have 2-D and 3-D radars. They generally have more fire control systems to bring to bear on the target. They have better ECM equipment. They are better ships, and we are upgrading the cruisers, as a matter of fact, with new systems and new missiles. All of the cruisers are getting the SM-2 missile.

Again the affordability issue—one of the best arguments that you could make for upgrading the FFG with a phased array radar would be to follow that up with SM-2 missile improvement. But again, it is the affordability issue. I just frankly don't see it in the cards that we would be able to do most of those and upgrade the ship.

Senator COHEN. Going back to your affordability question. There was some question raised as to why the Navy chose to send this ship out and have the contractor propose not only the building of the ship, but also the phased array radar system as well, rather than having the Government procure the system and provide it to the ship. Normally, you can procure cheaper than the private contractor, since he is going to add overhead, and other expenses to the cost of the ship.

The question has arisen as to whether or not this was a deliberate policy, or at least tactic on the part of the Navy to add more cost to the system in order to discourage going to a phased array upgrade, rather than in any way diminish the support for the Aegis system.

Admiral WALTER. Sir, I don't think that was the case. Admiral Fowler will probably want to follow up on this.

A fundamental problem in this is that we have been asked to put a system on a ship that has not been developed. As we said, we know what we think it is going to take in terms of time and cost to develop that radar. We thought, well, if that is being argued, then let's ask the builders.

OPEVAL

Senator **Cohen**. You mentioned in your testimony, as I recall, that in 1983, when the evaluation was made, it was satisfactory. Then it got on the ship and it wasn't satisfactory. What happened between the time of your initial evaluation and the OPEVAL?

Admiral **Walters**. What happened really was that we tested the sysem in all fair weather testing just off of Puerto Rico, and we had good weather. I don't know whether that was intentional or accidental, but we didn't have any bad weather. So it wasn't until we had the system installed later that we discovered that we had the problem with it being very susceptible to clutter and particularly heavy rainfall.

As far as the reliability issue is concerned, I don't think that one can condemn the MK-92 system any more than any other system that we field. Nine times out of ten, we run into some sort of reliability problem in a new fire control system. I think that was probably to be expected, although we always hope that it will not happen.

The clutter problem was simply because we didn't see that kind of result in the test.

Senator **Cohen**. The CORT system doesn't give you any better reliability in rain, does it?

Admiral **Walters**. Yes, sir, that is the big improvement, and that is what I wanted to show here is that the phase II does as well practically as the phase III does in clutter.

Senator **Cohen**. What I meant was that they are about roughly the same.

Admiral **Walters**. They are roughly the same, yes, sir, and that is what we feel is the biggest improvement that we have needed so that the system would perform in clutter.

Senator **Cohen**. Where does phase I show up? In rain, for example, where would that chart show phase I, at the bottom of the line?

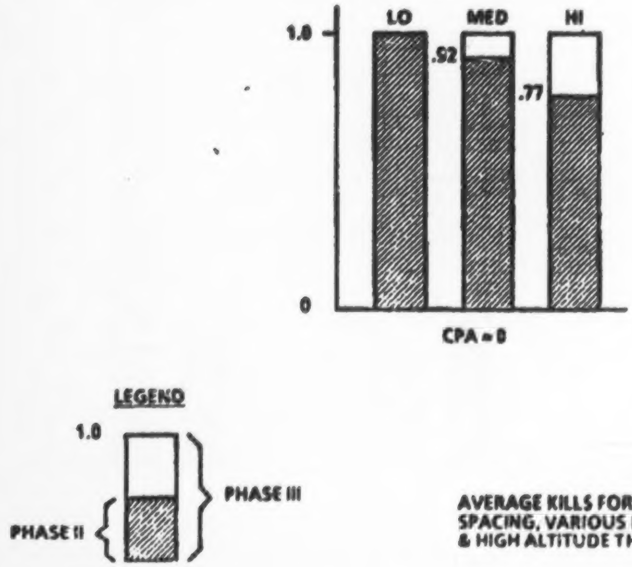
Admiral **Walters**. It would be down at the bottom of the line, yes, sir, because it does not perform well in the rain. The performance in clutter doubles, essentially, with phase II, and the reliability is further improved over phase I.

Senator **Cohen**. In the ECM environment, it is double that over phase II?

Admiral **Walters**. Yes, sir.

You can see the improvements there that you do get in the ECM environment, and that is almost a given with that kind of a radar.

AAW FIREPOWER EFFECTIVENESS
FFG 7 CLASS WITH MK-92 IMPROVEMENTS
(NORMALIZED VALUES OF AVERAGE KILLS)



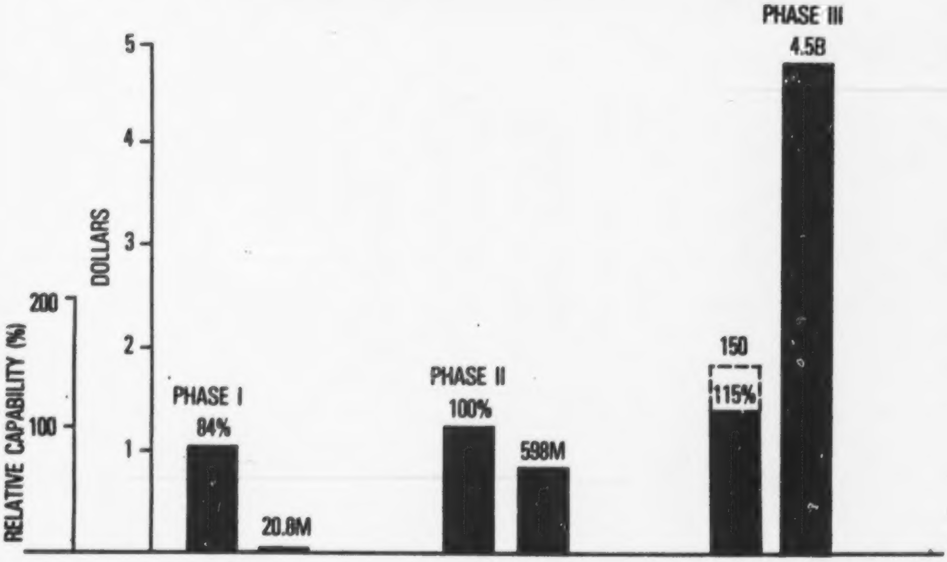
NOTE
AVERAGE KILLS FOR 8 TARGET STREAM, 10 SECOND SPACING, VARIOUS ENVIRONMENTS & LOW, MEDIUM & HIGH ALTITUDE THREATS.

If I could show you a couple more, just to throw up there, that have made the assumption that you are going to have an eight-target stream attack with 10-second spacing, and it shows that the performance will be against low altitude, medium altitude, and high altitudes. That shows that you get an improvement. The reason you don't get any improvement in the low that is because of the late detection, so the improved radar performance doesn't really buy you that much.

You do get an improvement at medium altitude, and you get a noticeable improvement in the high altitude, and that is going to be improved in the jamming environment, where the jamming tends to reduce your detection range more at high altitude than it does at low altitude, because you are not confined by the radar horizon.

The real telling part is the last slide, if you would, which shows the capability versus the cost. We can show you in closed session, Senator, the specific values, but you are going to see the same kinds of trends.

AAW CAPABILITY/COST



This is the real teller as far as we are concerned, the relative cost. In phase I, we spent $20.8 million, and we achieved 84 percent of the capability of the radar relative to the phase II. In phase II, we made a $598 million investment, or we will make it by the time we are finished, and believe we have solved our problems in clutter and reliability.

Senator COHEN. Except in rain.

Admiral WALTERS. No, sir, including rain.

What you get really in phase III, as nobody will argue, you get better performance in the ECM environment in phase III.

Senator COHEN. Please put back the chart. If you put phase III next to phase II there, you would have about the same chart; right?

Admiral WALTERS. What I have done is use phase II as the baseline.

Senator COHEN. What I meant by phase II, if you had to draw phase II and phase III in rain, they would come out roughly the same?

Admiral WALTERS. Yes, sir. Phase III will be just slightly better, but it is only a few percentage points, in rain. Where you get significant improvement in phase III is the ECM environment.

I have shown two figures there. One, if you assume that phase II is the baseline, you get about a 15-percent improvement by the jamming levels that the Navy predicts we will have, or you get a 50-percent improvement by the jamming levels that the company says we will be exposed to. Those are specifically a little higher jamming levels, and that is the difference here.

To look at the difference in the cost, that is where we have the problem. We are not sure that the marginal improvement that we see under questionable operational conditions of these ships is worth that kind of an investment. I guess we are frequently accused of always wanting everything, but in this case, it is capability we would like to have, but we don't think that it is really affordable.

Senator COHEN. When you have the $4.5 billion, what does not include; modernizing all 50?

Admiral WALTERS. Yes, sir. That includes the development costs and the modernization of the 50 ships.

Senator COHEN. You use the same baseline. You modernize all 50 with the phase II?

Admiral WALTERS. That is correct, and we will do that in that program.

Senator COHEN. In essence, what you are saying is, if your figures are correct, again you have to take into account that the first ship is going to be more expensive. The man behind you is saying no, and you are saying yes, which is it?

Admiral WALTERS. I think that the first ship will be more expensive.

Admiral FOWLER. There are some one-time costs of learning, but in a backfit program, where you are dealing with an operational ship and lots of other factors that drive your costs, you won't have the kind of learning you would have in new construction. The FFG-61 being the lead ship in the last of the construction program, doesn't permit us——

Senator COHEN. You are saying that in retrofits, you don't have a learning curve of any significance?

Admiral FOWLER. Not to the degree that you do in new construction where you have serial production like you have at Bath and Todd today.

Senator COHEN. The gentleman behind you differs. Why don't you state your own opinion.

What is your name, sir?

Commander BRINDEL. Comdr. Glenn Brindel from Naval Sea Systems Command.

FFG-61 COST SAVINGS

One of the cost savings that we would realize in an FFG-61 was that we could build this ship with the new support systems, everything to support the phased array radar. You would have the cost savings of not having to buy new GFE for a backfit kit for chilled water and those types of things; rip out old piping and put in new. I don't think that there would be very much cost savings at all in going to second ship in a backfit program.

It is different constructing it with a phased array and backfitting it. Those are two different scenarios. I don't think that the cost changes in a backfit program are going to be really significant.

Admiral FOWLER. The backfit program is just rough order of magnitude. We really haven't had good estimates on that.

Senator COHEN. In essence, what you are saying, in order to get the cost down, you are going to have to reduce the number of ships that are backfitted.

Admiral FOWLER. That is correct.

Senator COHEN. If you are going to go to phase III, in order to reduce the size of the cost, in your judgment, taking into account whatever savings may be achieved through learning curves which are marginal, you will have to go to a lower number of ships.

Admiral **Walters**. I think the other aspect that the commander doesn't give any account to is the fact that we are talking about, on the first ship at least, installing a radar that has not gone through the development phase. I can't conceive of that not being more expensive.

So I disagree with his assessment. There is going to be an upfront cost because the radar has not been developed, and we are trying to install it for the first time in this ship. The other things he says are true.

I think that that is the biggest hidden cost that we have in the whole problem here, trying to put a radar in production that has not gone through a development. It breaks all of the rules of acquisition that the Congress has essentially directed us to follow over the years. That is our major problem with this whole approach.

HIGH PRIORITY ON RADAR DEVELOPMENT

Senator **Cohen**. Counsel was just pointing out that one of the problems has been the history behind this, going back to 1980-81, when Congress assigned a pretty high priority to this in their budgetary actions.

In the 1981 budget, they had $20 million for the development of the program. In fiscal year 1982, the Navy said that further funds were not necessary because funds remained in the previous year. In fiscal year 1983, Congress provided $24.6 million, and the appropriations bill stipulated that no less than $40 million in the shipbuilding account was reserved for the radar upgrade. Then the fiscal year 1984 budget provided an additional $35 million in R&D. In 1985, the Navy has downgraded the $35 million to $4 million, which probably could drop through the cracks in any kind of a reprogramming level.

So the question of, how come, when Congress assigned a fairly high priority to this upgrade, there seems to have been little, I am not saying, energy devoted to it, but little interest shown?

Admiral **Walters**. I think that there has been a lot of interest, and I personally have devoted a lot of energy to the program.

We have had problems in defining exactly what we were going to do. We have had the problem from the very beginning, speaking very frankly, Senator, of having to deal with a contractor proposal that we have not been able to work through until very recently to the point where the Navy and the contractor understood the same kinds of things as to what was going to be built, what the requirement specifications were going to be, and, for that matter, how much it was going to cost.

There has been that difficulty of trying to come to an agreement on something that will really benefit the Navy if we are going to go ahead and spend that kind of money on it. I have had several discussions with the corporate executives with the idea that, hey, if we are going to do this, let's make sure that we do it right, that we agree upon what kind of a radar we need, what kind of specifications we should meet, and design the program so that we can get on with it.

The costs that are quoted by the contractor don't include the costs that have to be expended by Admiral Fowler's people, or by the other organizations that support these developments, such as testing.

One of the things, for example, that has been a problem in this all along is "go buy this system." We have said, no, we can't buy that until we test it. We want to see it tested in land based testing, and we want to see it tested aboard ship, because everything that we have ever taken to sea, that hadn't been tested, has bit us.

Admiral **Fowler**. Senator, we started in June 1982 on phase II, which is an essential part of phase III, and that is almost 2 years ago. I don't think that there is really the footdragging that your question implies.

Senator **Cohen**. Did you have something else that you wanted to say, Admiral.

Admiral **Fowler**. That is what I wanted to say.

Senator **Cohen**. I thought that you wanted to get in more than that.

Admiral **Fowler**. No.

Senator **Cohen**. Maybe you hear too many complaints coming from the Hill saying that you are spending too much money, and we don't need that many expensive ships.

The fact of the matter is that what is taking place, and what is evolving rather rapidly, is that these ships are not going to be able to survive a high or moderate threat environment. It seems to me that inevitably they are going to be in that environment.

If it came to a conflict with the Soviet Union, no matter where it is, I think you are talking about us using whatever assets we have to get our convoys where they have to go.

Admiral **Fowler**. I have a prepared statement that answers that question.

Senator **Cohen**. We can either talk about that or submit it.

WHAT ARE THE TRADEOFFS

The question becomes: What are the tradeoffs? I am not here to debate the point that we ought not to build something that we can't afford, but the real substantive question to me is, does this system give you a capability that we don't have now, and is it worth the price. Your answer is, yes, it is a capability that we don't have now, but it is not worth the price.

Admiral **Walters**. As we understand it today, that is correct.

If we had approached this in the way that it should have been approached at the beginning, we would have had a development program. We would have built a radar. We would have had some hardware. We would have taken it to a land based test. At that point in time, we would have learned enough about that system to determine whether it was going to give us the payoff worthy of taking to the sea test. Then, go through the next step.

By that time, we would have had some confidence that the system works, is going to be reliable, is going to have some sort of availability, who makes its spare parts, who provides training, and are these sorts of things affordable from the Navy's point of view. We would have had some confidence in the performance figures.

Senator COHEN. Why didn't we do that?

Admiral WALTERS. We have never been given the chance, Senator.

Senator COHEN. By whom?

Admiral WALTERS. We have been directed, almost from the beginning on this program, to buy the system and go into production. If you read the correspondence from the Secretary of the Navy, it has been very consistent.

First of all, we wanted to have a competitive procurement. We wanted to go out to industry. We are interested in the midlife upgrade of these ships, but we wanted to go to industry with some specifications that said: Give us a system that will operate in the kind of threat you are concerned about. Come back to us.

We think that we would have had a lot of input there. A lot of them would not have been X-brand radar, there would have been other frequencies which in many cases are preferable. At least, we would have had the best input from industry in total. From there I think we would have stuck to a program that would have gotten us the kind of system, I believe that you are interested in.

I am not sure whether the X-brand phased array radar we are looking at today is at all what we want, and that is why we have been reluctant.

Senator COHEN. You don't want Denny Smith coming over here challenging the phased array system with inadequate testing.

Admiral WALTERS. He certainly would have a heyday on this one.

Senator COHEN. Are you prepared to undertake those kinds of tests now? You said, if we had done it right. Are we prepared to do it now, if we proceeded to test it and evaluate it?

Admiral WALTERS. We have, I think, structured a program which would do that, yes, sir. It has not been executed yet because we have not signed the final contract. I think we have such a program at least outlined, and partially funded.

Senator COHEN. Admiral Fowler?

Admiral FOWLER. Would you like me to go into my prepared statement now?

Senator COHEN. Let me yield to Senator Wilson.

Do you have any questions?

Senator WILSON. No, Mr. Chairman, I really don't. Actually I have been listening to your questions and to the responses by Admiral Fowler and Admiral Walters, and I am struck by two things.

The first is that the legislation, which you proposed for the second time yesterday, which was accepted by the Senate, would seem to apply here. The problem that they have described is one that, it looks like, might have been avoided by a competitive bidding situation.

The second thing is that I am persuaded on the basis of what I have heard thus far, and particularly by this chart, to reach the same conclusion that Admiral Walters has. At this point, without having the benefit of Admiral Fowler's statement, I would be prepared to move to face reality and modify our earlier action with respect to the requirement that there be phased array on this particular frigate.

I think that it needs adequate radar, but for the money, I have to agree with Admiral Walters. I think that we would do well to modify and release them from that earlier requirement in phase III.

[The prepared statement of Admiral Walters follows:]

PREPARED STATEMENT OF VICE ADM. ROBERT L. WALTERS, U.S. NAVY, DEPUTY CHIEF OF NAVAL OPERATIONS FOR SURFACE WARFARE

Mr. Chairman and distinguished Members of the committee, it is an honor for me to appear before you today to discuss the fiscal year 1984 FFG and MK-92 fire control system.

Before proceeding to the fiscal year 1984 ship, I would like to provide you some background information on the overall FFG program. Prior to fiscal year 1984, fifty ships of this class were appropriated for the U.S. Navy. In addition four were purchased by the Royal Australian Navy from U.S. shipbuilders. The lead FFG-7, U.S.S. *Oliver Hazard Perry,* was appropriated in fiscal year 1973 and follow ship construction began in fiscal year 1975. The largest construction period was during the years 1976-1981 when 41 ships were appropriated.

Ships have been constructed at three shipyards; Bath Iron Works in Bath, Maine, Todd Los Angeles, California and Todd Seattle, Washington. Of the fist 50, Bath has delivered or is building 24, Todd Los Angeles 17 and Todd Seattle nine. Todd Seattle also built the four Australian ships. To date, 36 FFG-7s have been delivered to the U.S. Navy and another five will deliver during the remainder of calendar year 1984. By December of 1986, all 50 prior year ships will have delivered. For the past several years, the construction of FFG-7s has been characterized by early deliveries and cost underruns by the builders.

The mission of the FFG-7 is to provide self-defense and effectively supplement planned and existing escorts in the protection of underway replenishment groups, amphibious forces, and military shipping against sub-surface, air and surface threats. They are "design-to-cost" ships an do not include the most sophisticated anti-surface or anti-air warfare systems available, nor did the Navy envision that they would be exposed to the most severe threat, unless in company with more capable forces. With the addition of the Tactical Towed Array Sonar System (TACTAS) and the LAMPS I or LAMPS III helicopter, they will be highly capable ASW ships with a modest area AAW missile system and excellent self defense capability.

Within the context of the 600-ship Navy, we have identified a requirement for 101 frigates of all types. In addition to the 50 FFG-7s which have been appropriated, we have 46 of the FF-1052 *Knox* class, 10 of the FF-1040 *Garcia* class, 2 of the FF-1037 *Bronstein* class, and 6 of the FFG-1 *Brooke* class. Eventually 8 FF-1052 and 18 FFG-7 class ships will be assigned to the Naval Reserve Force.

During its fiscal year 1984 deliberations, the Congress authorized one FFG-7 not included in the President's Budget. The fiscal year 1984 DOD appropriations bill funded the extra ship and appropriated $116.4 million in new obligational authority. In addition, the fiscal year 1984 bill transferred $183.6 million from fiscal year 1983 and prior year SCN savings to the fiscal year 1984 FFG-7 construction line, "provided that the FFG-7 guided missile frigate shall be constructed with an upgraded MK-92 fire control system and an X-band phased array radar." Thus a total of $300.0 million was made available by the Congress for an fiscal year 1984 FFG-7 with a MK-92 X-band Phased Array Radar. For comparison purposes, in fiscal year 1983 the unit cost of a FFG-7 with a much less complicated radar was $310.4 million. To build an identical follow ship in fiscal year 1984 is estimated to cost a minimum of $336.6 million.

The language of the fiscal year 1984 DOD appropriations bill which required the ship to be equipped with the MK-92 X-band phased array radar caused concern in the Navy since the radar is not developed and it is not believed that it could be delivered and tested prior to the anticipated delivery of an fiscal year 1984 ship. In fiscal year 1983 the Congress appropriated $40 million for the purchase of an MK-92 X-band phased array radar for installation on one of the fiscal year 1983 ships. This issue remains unresolved as this would require a phased array radar even earlier. The Navy has not expended any of the fiscal year 1983 $40 million appropriated as installation in the fiscal year 1983 ship is unexecutable during the SCN envelope.

In an attempt to comply with the language of the fiscal year 1984 appropriations bill, in January of this year Navy requested that the two shipbuilders involved in FFG-7 construction provide a Cost and Feasibility Assessment for constructing one fiscal year 1984 FFG-7 with a MK-92 X-bank phased array radar. Each shipbuilder was requested to interface directly with Sperry Defense Electronics Corporation, the sole vendor for the Fire Control System, in order to provide a cost estimate on the ship with MK-92 X-band phased array radars with the radar as Contractor Furnished Equipment (CFE). Based on the responses from Todd and Bath, the minimum end cost of one FFG-7 in fiscal year 1984 would be about $473 million or $173 million more than appropriated in fiscal year 1984.

With the foregoing as background, I will review the history of the MK-92 fire control system and provide the Navy's assessment of the value of a MK-92 X-bank phased array radar and the costs and risk associated with such a program.

The MK-92 fire control system first went to sea in the mid 1970's when an operational evaluation was conducted in U.S.S. *Talbot* (FFG-4). The evaluation concluded that the system was operationally effective and suitable for fleet introduction, and the MK-92 fire control system was approved for installation in the FFG-7 and PHM classes. After the lead ship was delivered, another OPEVAL was conducted in 1979 which revealed serious deficiencies in both performance and reliability. Its effectiveness was particularly reduced in heavy rain and/or a sea/land clutter environment.

In March 1980 the MK-92 prime contractor, Sperry Gyro, addressed these problems by submitting an unsolicited proposal for development and simultaneous procurement of a four faced, X-band phased array radar upgrade. This proposal was rejected by NAVSEA because: specifications were not clearly defined, the ship impact was not addressed and it was predicated on procurement before testing.

In December 1980 RDT&E funds were added by Congress to develop an AAW upgrade for the FFG-7. Simultaneously, the CNO directed a three phase MK-92 upgrade program:

Phase I—Correct immediately all "quick fix" items.

Phase II—Provide significant performance improvements in a Clutter/ECM environment by development of a new coherent receiver transmitter (CORT).

Phase III—Identify a major AAW capability improvement for installation during the mid-life upgrade of the FFG-7 class.

The CNO program provides an orderly response to correct the MK-92 OPEVAL deficiencies identified in 1979 and identify options for a potential mid-life upgrade. Phase I provided near term improvements needed to effectively stabilize radar performance, particularly in clutter, and provided an automatic low elevation tracking mode. Phase I improvements have been tested at sea, incorporated in production since fiscal year 1981, and will be backfitted in all ships by the end of fiscal year 1985. Phase II, the mid term improvement, required more extensive development of the coherent receiver transmitter (CORT) and will provide a dramatic increase in radar performance and reliability. Performance in a clutter environment will improve by 50 percent the significant gains made with Phase I. Further improvements in ECCM and reliability also will be realized. The Navy is convinced that Phase II provides these ships an AAW combat system that fully supports their mission and the installed Standard Missile-1 capability. The CNO's plan for Phase III was to identify a major AAW capability improvement for installation during the FFG-7 class mid-life upgrade. Analysis conducted by Navy and OSD incident to Phase III definition concluded that an X-band radar upgrade beyond CORT, such as the phased array, did not provide a cost-effective gain in military capability. To constrain the radar upgrade to X-band only would preclude consideration of other attractive technologies in alternate frequency bands. Navy prefers industry-wide competitive development to design an improved state-of-the-art defense radar and weapons control system for mid-sized combatants. This system would be capable of detecting, tracking, and supporting weapons engagement against very small and fast targets in heavy clutter and ECM. Furthermore it must provide significant improvement in performance over present systems. The Sperry X-band phased array radar does not fully meet these requirements, particularly the requirement for significant improvement over present systems. Radar performance assessment is very sensitive to the threat scenario and expected jamming levels. Sperry's assessment of Phase III performance is based on threat parameters that support an X-band radar and do not agree with the threat and jamming levels the Navy projects the FFG-7 to encounter. Moreover, the cost of development and the relatively high unit cost in series production mitigate against this approach for a marginal gain in performance and effectiveness.

From early 1981 until mid 1982 the dialogue between the Congress, the Navy and the contractor continued on development of the MK-92 X-band phased array radar. Throughout this period, Navy consistently stated that it could not justify a requirement for the system and was reluctant to proceed. In order to comply with Congressional direction, the Secretary of the Navy in July 1982 agreed to proceed with development of the Sperry MK-92 X-band phased array radar as the Phase III system.

The contract was to be a sole source/fixed price to Sperry, as no other vendor or contractor could satisfy the direction received.

In his letter to the Congres of 30 July 1982, SECNAV stated:

* * * "The addition of a four-faced, X-band phase array radar to the present MK-92 system may not result in an increased military capability commensurate with the projected cost.

Nevertheless, the Navy will comply with Congressional direction * * *

It is planned that this development lead to a sole source, fixed price contract to develop an Engineering Development Model (EDM) . . .

Follow-on at sea testing will be scheduled subject to the satisfactory progress of the EDM development and land based testing. Naturally, any production decision will depend on successful completion of the development program."

In August of 1983, the phased array radar development program was initiated by a letter contract with Sperry. We are still operating under that contract. The cost for Phase III development through land-based testing is expected to be $189.4 million in then year dollars. It is important to note that the Phase I program is now undergoing installation in the Fleet. Initial experience is encouraging in that reliability and performance are improved. Phase II, to develop a Coherent Receiver/Transmitter is in progress. The development cost of Phase II (CORT) is expected to be $82 million in then year dollars. The program is approximately six months behind schedule and is experiencing cost growth. The procurement cost for CORT will be about $8 million per ship in fiscal year 1987 dollars. CORT is a necessary and essential element of Phase III. The backfit cost fo the X-band phased array radar is estimated to be at least $70 million per ship in fiscal year 1985 dollars if purchased in lots of three. This is considered an affordability issue in this class of ship.

In view of the high cost of the fiscal year 1984 FFG with a MK-92 X-band phased array radar and our inability to comply with system acquisition directives which meet Congressional guidance to test prior to procurement, on 27 March 1984 the Secretary of the Navy suggested to the Congress an alternative plan. This plan would build the fiscal year 1984 FFG with the improved receiver and transmitter modifications currently in development which is the Phase II system described by the CNO. It would utilize the $300 million appropriated in fiscal year 1984 and the $40 million from fiscal year 1983. The ship would cost about $376 million and SECNAV in the 27 March letter stated his willingness to reprogram SCN funds for the remaining $36 million. From a standpoint of fiscal reality and adherence to acquisition and testing policy, this is the most reasonable solution. Moreover, the installed warfighting capability would be consistent with that to be provided to the rest of the class. I urge your support for the SECNAV initiative, an fiscal year 1984 FFG with a Phase II upgrade of the MK-92 fire control system.

Senator COHEN. Admiral Fowler, you may proceed.

STATEMENT OF VICE ADM. EARL B. FOWLER, U.S. NAVY, COMMANDER, NAVAL SEA SYSTEMS COMMAND

Admiral FOWLER. Senator, a good bit of this is somewhat repetitious now in view of the questioning. If you would like, I could just submit it.

Senator COHEN. Why don't you submit it for the record, and just touch whatever highlights you think have to be touched upon.

Admiral FOWLER. I think that it is important to note, for the committee's information, that we had a contract in 1981, which started the fourth flight of the FFG-7 ships. We have options that are still available, that can be exercise.

The constraint that says that we have to construct this ship with the phased array radar has prevented us from proceeding ahead with the 1984 buy. We have recommended the MK-92 phase II upgrade already, and the costs, as Admiral Walters has stated, are included in a little more detail in my statement, which I will submit for the record, with you permission.

[The prepared statement of Admiral Fowler follows:]

Prepared Statement of Vice Adm. Earl B. Fowler, Jr., USN, Commander, Naval Sea Systems Command

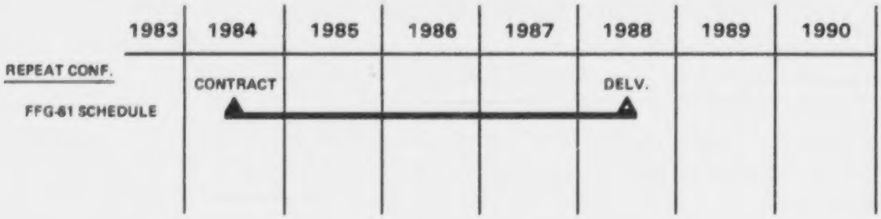
Mr. Chairman and members of the committee: I am Vice Admiral Earl B. Fowler, Commander, Naval Sea System Command. It is a pleasure to appear before you today to discuss the fiscal year 1984 FFG and the MK 92 Fire Control System. The fiscal year 1984 Appropriation Act directed that the fiscal year 1984 FFG ". . . shall be constructed with an upgraded MK 92 Fire Control System and an X-band Phased Array Radar . . ." the Navy has taken actions to implement this direction.

CURRENT STATUS

The latest configuration of the FFG-7 Class known as the Fourth Flight started with the ships authorized in fiscal year 1981. Competition among Bath Iron Works, Todd Seattle, and Todd Los Angeles resulted in awards of three ships to Bath, one ship to Todd Seattle, and two ships to Todd Los Angeles. Option prices were obtained under the competition in fiscal year 1981 for future awards. In fiscal year 1982 and 1983 options were exercised for three ships to Bath and two ships to Todd Los Angeles. Options remain from the fiscal year 1981 competition which can be exercised to award an FFG on the Fourth Flight configuration to either Bath or Todd Los Angeles. Last year, fixed price incentive options with Bath and Todd Los Angles for construction of an additional FFG were extended until 30 April 1984. They have just been extended again until 30 June 1984. We have conducted a technical feasibility and impact study of the installation of the phased array radar on the FFG. The system can be installed within the existing spaces without significant effect on speed and endurance. However, there is a major impact on the ship's displacement, structure, and support systems such as cooling water, air conditioning, and power systems. Using this study, we requested proposals from the two shipbuilders to procure and install the phased array radar on the fiscal year 1984 FFG during construction. This would be a modification to the contract for the Fourth Flight configured FFG. The phased array radar would be purchased by the shipbuilder under a firm fixed price contract from Sperry. Using this shipbuilder and Sperry input, we have developed the cost and schedule estimates I will discuss later.

MK 92 FIRE CONTROL SYSTEM UPGRADE STATUS

In June of 1982, the Navy started its Phase II upgrade of the MK 92 Fire Control System. A critical design review was just completed in mid-April. The Phase II development is a building block for the phased array radar. The Phase II integrated combat system testing will be completed in late 1987. The phased array radar development was initated in August of 1983 under a firm fixed price contract with Sperry. Critical design review is scheduled for fall 1985. Normal Navy acquisition policies would not permit commitment to production prior to critical design review due to cost, schedule, and performance uncertainties.



COST AND SCHEDULE

If the fiscal year 1984 FFG were awarded on 30 June 1984 configured as a repeat Fourth Flight FFG, the budgeted end cost would be $336.6 million, and it would deliver in 1988 as shown on Chart I. This ship would include the Phase I upgrade of the MK 92 Fire Control System.

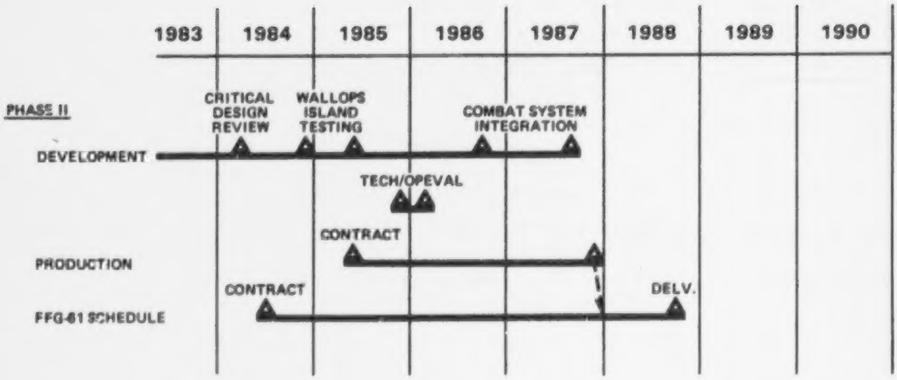


CHART II

If the FFG were constructed with the Phase II system, the budgeted end cost would be $376.3 million, and the ship would deliver in 1988 as shown in Chart II. The Phase II system has considerably less physical impact on the ship design than the phased array radar. Its development is approximately 1½ years ahead of the phased array radar. A firm fixed price production contract for the Phase II system would be awarded to Sperry by the Navy not later than May 1985. Prior to delivery of the production unit, the combat system integration and testing would have been completed. At delivery in September 1988, the ship would have a fully integrated combat system with full anti-air and anti-surface warfare capability. This is a full year before reaching a similar point with the phased array radar, with less risk.

The budgeted end cost estimate of $473 million to purchase the fiscal year 1984 FFG with the phased array radar is based on our existing priced option for the ship, the shipbuilder's input of cost to purchase and install the phased array radar, and the Navy estimates for combat system integration and system support. This is $133 million above the allowed funds in fiscal year 1984 and assume use of the $40 million of fiscal year 1983 SCN for the phased array radar. This estimate is also predicted on awarding the shipbuilding contract no later than 30 June 1984, and the shipbuilder awarding a firm fixed price production contract to Sperry for the phased array radar in August of this year. This award would occur just 1 year after the start of the development effort and well before completion of preliminary design or any developmental testing. The radar itself would have developmental and factory testing done prior to delivery to the ship. The schedule for installation of the phased array radar on FFG-61 is shown on Chart III. At ship delivery, the phased array radar will be installed but not tied into the remainder of the combat system, and thus the ship will have limited anti-air and anti-surface warfare capability until late 1989 when the combat system integration and testing are completed. This would be the earliest date, assuming no developmental problems are encountered. A summary cost comparison is provided in Chart IV.

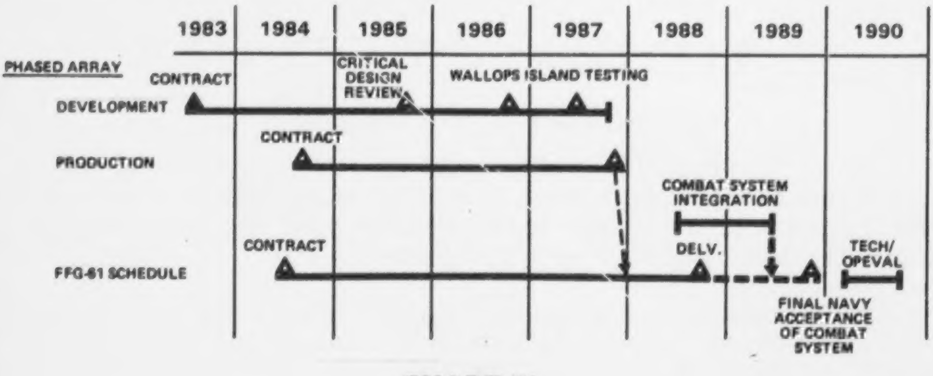


CHART III

REPEAT FFG CONFIGURATION	$336.6M
FFG WITH PHASE II SYSTEM	$376.3M
FFG WITH PHASED ARRAY RADAR	$473.0M

CHART IV

BACKFIT PLAN STATUS

The fiscal year 1984 House Appropriations Committee report stated that it expected the Navy to present a full fleet implementation plan of the MK 92 Upgrade Phased Array Radar on the FFG-7 Class Frigate. Based on the technical feasibility and impact study that has been conducted, we estimate that it would cost at least $70 million per ship to backfit the phased array radar and take about 8 months. This is a rough estimate. There are several undecided issues on the backfit such as whether the phased array radar would be installed on all 50 FFG's or on the 34 active fleet ships. The schedule of the backfit has not been defined. Refined cost and schedule estimates would need to be determined in order to provide the expected implementation plan, but you can be assured it will be an expensive program.

SHOULD COST STUDY

The fiscal year 1984 Senate Appropriations Committee report directed the Navy to submit a Should Cost Study no later than 1 July 1984. This was to certify in writing that firm costs and schedules exist and that current Navy concerns about the affordability of this program have been resolved. This certification cannot be made in this timeframe due to the uncertainty still remaining. The certification could not be provided until after the critical design review, currently scheduled for fall 1985.

SUMMARY

Given the cost and schedule differences; the much higher developmental, technical, and schedule risk of the phased array radar; the large backfit costs; and the fact that the increased capability gained with the phased array radar is not commensurate with its projected cost, the Navy requests concurrence to proceed with developmental and installation of the Phase II MK 92 Fire Control System on the fiscal year 1984 FFG.

In order to do this, legislation is necessary to permit procurement of the fiscal year 1984 FFG with the Phase II system and to use the $40 million of fiscal year 1983 SCN currently identified for the phased array radar. The Navy has identified the additional $36 million that would have to be reprogrammed to fully fund this procurement. The Navy does need the ship, but we would prefer to buy it at a reasonable price with an acceptable level of program risk. I thank the committee for its support in this matter.

Senator **Cohen**. Thank you very much, Admiral Fowler.

I am told that we are going to have a vote fairly soon on the floor, and what I would like to do is go into executive session just so I will have a better understanding of some of the charts that I have seen. I would like a little bit of verbal explanation for my benefit.

So if we could go into a closed session, we can do that fairly quickly, and then break for the vote.

UPGRADING FIRE CONTROL SYSTEM

Admiral **Walters**. If I could, before we go to the closed session, I would like to make the bottom line of my statement. As you know, the Navy is interested in having the ship, that has never been in issue. The issue has only been the degree to which we upgrade the fire control systems.

Our proposal to put a phase II system, which will be the best that we think we can physically meet in the building schedule, will give us a very good system on that ship, and it will be the forerunner of those backfits that are going to go on the rest of the platforms.

Senator COHEN. Thank you very much, Admiral.

We will now go into an executive session, and the room will have to be cleared.

[Whereupon, at 10:57 a.m., the subcommittee proceeded to executive session.]

EXECUTIVE SESSION

Senator COHEN. Admiral Fowler, I am more concerned about, having gone through the charts that are on pages 2, 3, and 4, being clear in my own mind. If you could clarify them and if you have any followup testimony to your unclassified statement, please proceed.

Admiral FOWLER. If you will look at the charts, I will try to run you through exactly what happens.

Typical of Soviet missiles for use against surface ships are the surface or subsurface launched SSN-7, SSN-19 and SSN-22 and the air launched AS-4 and AS-6 missiles. The SSN-7 is a [deleted] cruise missile launched from submerged *Charlie* class submarines. It has an operational range [deleted].

The SSN-19 is a long-range [deleted] cruise missile that can be launched from both surface and subsurface platforms. It has a range [deleted].

The SSN-22 is also a [deleted] cruise missile, [deleted].

The AS-4 is a [deleted] missile carried by Blinder B and Backfire B aircraft. It has a maximum range [deleted], depending on the variant.

The AS-6 is also a [deleted] missile carried by the modified Badger C and Badger G aircraft. It has a maximum antiship range [deleted].

Chart 1 of my prepared statement shows the flight profiles of these missiles [deleted].

Performance of the MK-92 [deleted] is essentially the same [deleted] and this, therefore, is not addressed in [deleted] performance charts. The primary surveillance capability [deleted] is provided [deleted].

Chart 2 of my statement shows the MK-92 phase II performance [deleted]. Initial ship detection would be made [deleted].

Initial detection by the MK-92 would occur [deleted] detection to launch reaction time, these targets would be intercepted [deleted] respectively.

[Deleted] initial detection would be made [deleted]. In the 1990 projected [deleted] environment [deleted]. Missile intercept [deleted] would then occur [deleted] dependent on environment.

Against the high altitude AS-4, initial detection would occur [deleted] detection would be passed to the MK-92 phase II fire control system [deleted]. Interception would occur [deleted].

With the MK-92 phase III phased array radar upgrade depicted in chart 3 of my statement initial detection of all the missiles would occur [deleted] as in chart 2. The phased array radar would detect [deleted] missiles [deleted].

Acquisition and intercept would occur [deleted]. Missile intercept would occur [deleted].

Against the AS-4, the MK-92 phased array radar acquisition occurs [deleted].

Missile intercept would occur [deleted]. This is an improvement [deleted] over the phase II system.

I have shown you the capability of the phase II and phase III systems with the FFG-7 class combat system against the Soviet threat. While it is hard to generalize, chart 4 of my statement shows the relative capability of the MK-92 fire control system for all three phases, with phase II being 100 percent.

This chart was derived [deleted]. The dotted area on the phase II capability plot represents the greater increase in——

Senator COHEN. Do you mean phase III?

Admiral FOWLER [continuing]. The phase III capability plot represents the greater increase in capability that has been claimed by the manufacturer, but using [deleted] assumptions that the Navy does not agree with.

Also on chart 4 of my statement are the relative costs for each of the phases as we have discussed earlier in our briefing. The rest, Senator, I believe is material that we have covered in our unclassified session.

[Prepared followup statement by Admiral Fowler follows:]

PREPARED STATEMENT OF VICE ADM. EARL B. FOWLER, JR., USN, COMMANDER, NAVAL SEA SYSTEMS COMMAND

This testimony is a follow-up to my unclassified statement. I have already described phase II and III of the MK-92 Fire Control System Upgrade Program and their status. I will now discuss their specific performance characteristics. Most of the information in this statement is classified secret.

THREAT

Typical of Soviet missiles for use against surface ships are the surface or subsurface launched SSN-7, SSN-19 and SSN-22 and the air launched AS-4 and AS-6 missiles. The SSN-7 is a [deleted] cruise missile launched from submerged *Charlie* class submarines. It has an operational range of between [deleted] nautical miles. The SSN-19 is a long-range [deleted] cruise missile that can be launched from both surface (*Kirov* CGN) and subsurface (*Oscar* SSGN) platforms. It has a range [deleted]. The SSN-22 is also a [deleted] cruise missile, [deleted].

The AS-4 is a [deleted] missile carried by Blinder B and Backfire B aircraft. It has a maximum range [deleted] depending on the variant. The AS-6 is also a [deleted] missile carried by the modified Badger C and Badger G aircraft. It has a maximum antiship range [deleted]. Chart 1 shows the flight profiles of these missiles [deleted].

SOVIET ANTI-SHIP MISSILE PROFILES

[Deleted.]

CHART 1

MK 92 DETECTION CAPABILITY

Performance of MK 92 [deleted] is essentially the same [deleted] and this therefore is not addressed in [deleted] performance charts. The primary surveillance capability [deleted] is provided [deleted].

PHASE II PERFORMANCE

Chart 2 shows MK 92 phase II performance against the Soviet threats. [Deleted.] Initial ship detection would be made [deleted]. Initial detection by the MK-92 would occur [deleted] in any environment. With a loaded launcher, and the demonstrated [deleted] detection to launch reaction time, these targets would be intercepted [deleted]. Respectively, initial detection would be made at [deleted]. Missile intercept would then occur [deleted] dependent on environment.

Against the high altitude AS-4, initial detection would occur [deleted] detection would be passed to the MK-92 phase II fire control system [deleted] interception would occur [deleted].

[Deleted.]

PHASE III PERFORMANCE

[Deleted.]

CHART 3

With the MK-92 phase III phased array radar upgrade depicted in chart 3, initial detections of all the missiles would occur [deleted] as in chart 2. The phased array radar would detect [deleted] missiles. Acquisition and intercept would occur [deleted]. Missile intercept would occur [deleted].

Against the AS-4, the MK-92 phased array radar acquisition occurs [deleted]. Missile intercept would occur [deleted]. This is an improvement [deleted] over the phase II system.

CAPABILITY VERSUS COST

I have shown you the capability of the phase II and phase III systems with the FFG-7 class combat system against the Soviet threat. While it is hard to generalize, chart 4 shows the relative capability of the MK 92 fire control system for all three phases, with phase II being 100%. This chart was derived [deleted]. The dotted area on the phase III capability plot represents the greater increase in capability that has been claimed by the manufacturer, but using [deleted] assumptions that the Navy does not agree with.

Also on chart 4 are the relative costs for each of the phases. These costs include development, procurement of the system and spares, support and backfit installation on all FFG-7 class ships over an eight year period beginning in FY 1987. These figures are a rough order of magnitude and would have to be refined, but they show the relative differences in cost. The large cost of the phase III Upgrade Program is not commensurate with the increased capability gained.

AAW CAPABILITY/COST

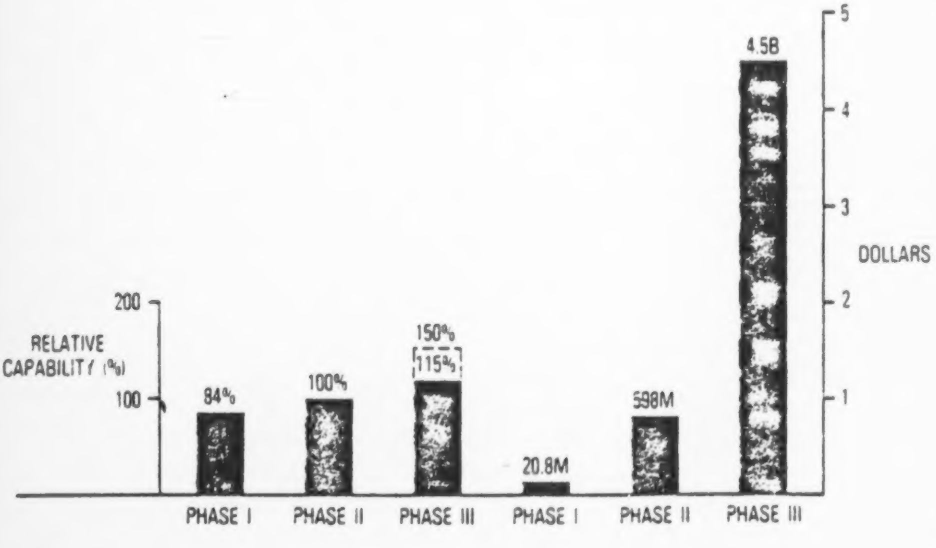


CHART 4

SUMMARY

The X-band phased array radar upgrade does offer a desirable increased capability however, the Navy does not consider it to be affordable. The construction of the FY 84 FFG with an X-band phased array radar and the backfit of this radar on the other FFG-7 class ships is not the best use of our limited resources. I strongly urge the committee's support of the Navy's recommendation to construct the FY 84 FFG with a MK 92 phase II system and to backfit the phase II system on all FFG-7 class ships.

Senator COHEN. Thank you very much, Admiral Fowler. I don't have any questions.

Senator WILSON. I don't have any questions either, Mr. Chairman.

Senator COHEN. That is all we have, gentlemen. Thank you very much for coming.

[Whereupon, at 11:06 a.m., the subcommittee adjourned.]

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